APPENDIX L

Draft Biological Evaluation for Forest Service Sensitive Species

Appendix L

Pacific Connector Gas Pipeline Project

Draft Biological Evaluation

September 2015

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Table of Contents

List of Tables

List of Figures

List of Appendices

Acronyms and Abbreviations

BA	Biological Assessment
BBS	Breeding Bird Survey
BCR	Bird Conservation Region
BE	Biological Evaluation
BI	Beneficial Impact
BLM	Bureau of Land Management
BMP	best management practices
CMP	Compensatory Mitigation Plan
CR	Clearcut-Regenerating
dB	decibels
dBA	A-weighted decibels
dbh	diameter at breast height
DEIS	Draft Environmental Impact Statement
ECRP	Erosion Control and Revegetation Plan
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FEIS	Final Environmental Impact Statement
Forest Service	U.S. Department of Agriculture, Forest Service
GAP	Gap Analysis Project
GIS	Geographical Information System
HDD	Horizontal Directional Drilling
ISSSSP	Interagency Special Status/Sensitive Species Program
LAA	Likely to Adversely Affect
LNG	Liquefied Natural Gas
LO	Late Successional-Old Growth
LRMP	Land and Resource Management Plan
LSR	Late-Successional Reserve
LWD	large woody debris

MIIH	May Impact Individuals or Habitat but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species
MP	milepost
MS	Mid-Seral
NE	No Effect
NFS	National Forest System
NJ	Not likely to jeopardize the continued existence for proposed species
NLAA	Not Likely to Adversely Affect
NRIS	Natural Resource Information System
NSO	northern spotted owl
NWFP	Northwest Forest Plan
NWR	National Wildlife Refuge
NI	No Impact
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Information Center
Pacific Connector	Pacific Connector Gas Pipeline, LP
PCT	Pacific Crest Trail
POD	Plan of Development
Project	Pacific Connector Gas Pipeline Project
ROW	right-of-way
SBS	Siskiyou BioSurvey, LLC
TEWA	Temporary Extra Work Area
UCSA	Uncleared Storage Area
WOFV	Will Impact Individuals or Habitat with a consequence that the action will contribute to a trend toward Federal listing or cause a loss of viability to the population or species

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1.0 INTRODUCTION

This Draft Biological Evaluation (BE) evaluates potential impacts to U.S. Department of Agriculture, Forest Service (Forest Service) sensitive species on National Forest System (NFS) land from construction and operation of the Pacific Connector Gas Pipeline Project (Project), proposed by Pacific Connector Gas Pipeline, LP (Pacific Connector). The proposed Project consists of an approximately 232-mile natural gas pipeline that crosses the Umpqua, Rogue River, and Winema national forests in Oregon. Species considered in this BE are those listed by the Forests as sensitive species from the December 1, 2011 Regional Forester Special Status Species List, that can be found on the Interagency Special Status/Sensitive Species Program (ISSSSP) website (ISSSSP 2011). Impacts to species that are listed or proposed for listing under the federal Endangered Species Act (ESA; 16 U.S.C. §§ 1531 et seq.) are discussed in the Biological Assessment (BA) and not are discussed in this BE, even where these species are Forest Service sensitive species. Survey and Manage Species that have the potential to be affected by the Project on federal land, including species that are also Forest Service sensitive species are not discussed in this BE, but instead are discussed in the Survey and Manage Species Persistence Evaluation, Appendix K to the Final Environmental Impact Statement (FEIS; FERC 2015).

2.0 PROPOSED ACTION AND ACTION ALTERNATIVES

As filed with the Federal Energy Regulatory Commission (FERC) on June 5, 2013 under FERC Docket No:CP13-492-000, the Project consists of a new 232-mile, 36-inch diameter, natural gas pipeline and associated aboveground facilities that extends from a new liquefied natural gas (LNG) export terminal (Jordan Cove LNG Terminal) on the North Spit of Coos Bay, Oregon through Coos, Douglas Jackson, and Klamath counties before terminating near Malin, Oregon (Figure 1). The pipeline would cross 10.8 miles within the Umpqua National Forest, 13.7 miles within the Rogue River National Forest, and 6.1 miles within the Winema National Forest. The pipeline right-of-way (ROW) would generally consist of a 95-foot wide construction corridor, of which 65 feet would be allowed to revegetate after construction is completed. A more detailed description of the Project, including its Purpose and Need, can be found in Section 2.0 of the FEIS (FERC 2015).

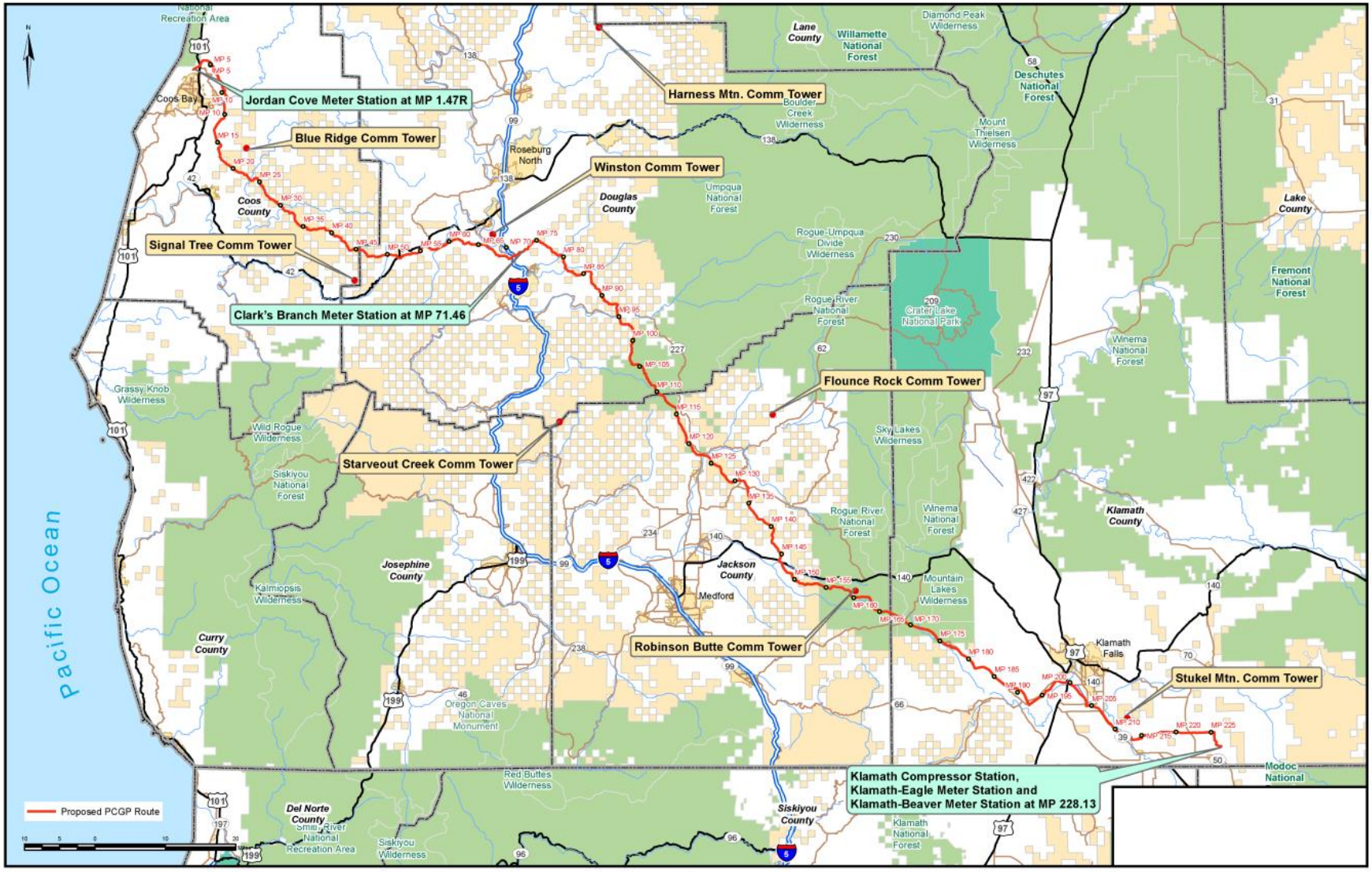

Figure 1: General Location of the Proposed Project

Alternatives to the proposed action considered on Forest Service land include the no action alternative, major route alternatives (alternative route segments), and minor route alternatives (minor route variations) (FERC 2015, Pacific Connector 2013). The no action alternative is assumed to have no impact on the species discussed in this BE, and thus this alternative is not discussed further. Major route alternatives are generally those that follow different routes through a majority of the area between the beginning and ending points of the proposed action; no alternatives that avoided NFS land entirely were considered due to ownership patterns in Southwest Oregon (FERC 2015, Pacific Connector 2013). Nonetheless, during preliminary route selection and the feasibility analysis, numerous alternative route segments were analyzed, and this selection process is summarized here.

During the course of refining the route alignment for the currently proposed route, Pacific Connector incorporated five minor route variations on NFS lands to avoid impacts to rare Survey and Manage fungi. Although these minor route variations were included in the June 2013 application (Pacific Connector 2013), and thus have been incorporated into the proposed action, the rationale behind these route adjustments is described below in order to demonstrate avoidance measures and provide context for the proposed route. In some instances, the Forest Service determined that Pacific Connector's initial minor realignments were inadequate based on species persistence evaluations and proposed additional realignments in our draft Environmental Impact Statement (DEIS; FERC 2014). Pacific Connector agreed to make these adjustments, and filed minor route adjustments with FERC on January 19, 2015 that comply with Forest Service requirements.

As the major and minor route alternatives discussed here have all either been discounted or incorporated into the proposed action, impacts to each species discussed in this BE are not evaluated for each of these alternatives. A general description of these action alternatives and the rationale behind their selection or incorporation into the proposed action are presented in this section; however, Sections 3.0 through 6.0 address the proposed action only. A detailed alternatives analysis can be found in Resource Report 10 of the Application for Certification filed with FERC on June 5, 2013 (Pacific Connector 2013), and in Chapter 3 of the FEIS (FERC 2015).

Seven major route alternatives and six minor route alternatives were considered in the three national forests crossed by the Project. As described below, the proposed routes in the national forests are the result of various constraints analyses, meetings and site visits between Pacific Connector and Forest Service biologists.

2.1 Umpqua National Forest

Pacific Connector evaluated three route alternatives and various construction measures (such as narrowing the construction ROW) in the vicinity of Long Prairie (mileposts [MPs] 104.8 – 111.5) to avoid or minimize potential impacts to cultural resources and to address the concerns of the Forest Service and the Cow Creek Band of Umpqua Indians. Based on these evaluations and consultations with the Forest Service and Cow Creek Band of Umpqua Indians, Pacific Connector determined that the only feasible/constructible alternative to ensure safety, stability,

and integrity is the Compromise Route, which is approximately 2,000 feet longer than the original 2006 route and requires crossing steep slopes and the East Fork of Cow Creek.

After further consultation with the Forest Service, Pacific Connector further modified the Compromise Route to avoid impacts to a rock quarry, Riparian Reserves, northern spotted owl (NSO; *Strix occidentalis caurina*) nest sites, waterbody crossings, and dispersed recreation areas. These modifications are now incorporated into the 10.8-mile proposed route on the Umpqua National Forest.

2.2 Rogue River National Forest

Pacific Connector evaluated three alternatives to the proposed route and various construction measures (such as co-locating the pipeline along existing roads) to minimize potential impacts on NSO, late-successional reserves (LSR), wetlands, and Riparian Reserves. Between MPs 155.1 and 168.9, the Forest Service identified an alternative that would be within or parallel to existing forest roads almost entirely through the National Forest. By using existing cleared corridors (forest roads), this alternative serves to minimize fragmentation and impacts to LSRs. This alternative would also cross the Pacific Crest Trail (PCT) along an existing road, which would minimize potential impacts to trail users by avoiding the creation of a separate linear crossing of the trail.

Pacific Connector studied the Forest Service alternative and determined that the alignment was feasible for the most part, except where the alignment followed tight radius road curves. During initial routing efforts for the Original May 2006 Route, Pacific Connector avoided aligning the Project along forest roads because of the perceived impact that the widened corridor (i.e., 95 feet) would cause, as forest roads are only about 20 to 30 feet in width and traverse mature forest stands.

After further consultation with the Forest Service, Pacific Connector developed the current proposed route, which follows the original May 2006 Route more closely but uses existing forest clear-cuts or thinned areas to minimize impacts to mature forests and the Big Elk NSO nest patch. The proposed route in this area follows existing roads where possible and is aligned to avoid impacts to wetlands. This route is also designed to minimize side slope construction and extra work area requirements between MPs 155.1 and 159.6, and to avoid a wetland Riparian Reserve area between MPs 168.0 and 168.9. The Forest Service also identified an alternative for crossing the PCT which is discussed separately below, under Winema National Forest.

Between 2010 and 2014, Pacific Connector completed surveys for Survey and Manage species along route alternatives that passed through federally-managed lands. During these field surveys, the Survey and Manage fungi *Gymnomyces abietis, Sedecula pulvinata,* and *Hygrophorus caeruleus* were detected between MPs 154.7 and 155.1,158.0 and 158.4, and 164.2 and 164.3, respectively (SBS 2010, FERC 2015). Minor route variations were developed to avoid these Survey and Manage fungi locations and were incorporated into the proposed route. The Forest Service determined that these initial realignments were inadequate based on their species persistence evaluations and proposed additional realignments in our DEIS (FERC

2014). Pacific Connector agreed to make these adjustments, and filed minor route adjustments with FERC on January 19, 2015 that comply with Forest Service requirements.

2.3 Winema National Forest

Pacific Connector identified two short alternative route segments within the Rogue River and Winema national forests in Klamath County between MPs 167.5 and 169.1. The western segment crosses the PCT while the eastern segment crosses the Dead Indian Memorial Highway. These two alternative crossings are referred to collectively as the PCT and Dead Indian Memorial Highway Alternative Route. Note that these alternatives are also discussed above in Section 2.2 as part of the larger re- route under Rogue River National Forest; however, the PCT and Dead Indian Memorial Highway Alternative Route spans both the Rogue River and Winema national forests and is discussed in more detail here.

When Pacific Connector first mapped out its pipeline route in 2006, it considered a straight line perpendicular crossing of the PCT at MP 167.8. This would have created an unnatural tunnel-like visual effect through the forest that would not have met Forest Service standards for the Retention or Partial Retention Visual Quality Objective for the PCT. The Forest Service recommended a realignment to minimize visual impacts to the PCT. Pacific Connector reviewed the proposed alignment modification using existing maps, aerial photography, and contour data. Based on desktop analysis, Pacific Connector determined that the Forest Service's modification was feasible.

During field surveys, Survey and Manage fungi species were identified on the Winema National Forest: *Hygrophorus caeruleus* was identified between MPs 168.6 and 169.1, both *Hygrophorus caeruleus* and *Choiromyces alveolatus* were identified between MPs 171.2 and 173.0, and *Arcangeliella crassa* was identified between MPs 173.18 and 173.32. Pacific Connector incorporated minor route deviations into the proposed route to avoid these Survey and Manage fungi species. The Forest Service determined that the initial realignment between MPs 171.2 and 173.0 was inadequate and proposed an additional realignment in the DEIS (FERC 2014). Pacific Connector agreed to make this adjustment, and filed minor route adjustments with FERC on January 19, 2015 that comply with Forest Service requirements (Pacific Connector 2013, SBS 2010, FERC 2015).

The proposed route is expected to have similar or slightly fewer impacts than the 2007 Route because it would require less clearing of old growth forest within a known NSO home range, avoid Survey and Manage fungi, and implement measures to reduce the width of the construction ROW at the PCT crossing, as well as other measures to minimize impacts to users of this trail. These modifications are now incorporated into the 6.1-mile proposed route.

3.0 PRE-FIELD REVIEW

Species considered in this BE are those Forest Service sensitive species with documented or suspected occurrence(s) in National Forest(s) crossed by the Project, per the ISSSSP (ISSSSP 2011). A documented occurrence means that a species is known to be located on land administered by the Forest Service based on historic or current known sites of a species, reported by a credible source and for which the Forest Service has knowledge of written, mapped, or specimen documentation of the occurrence (ISSSSP 2011). A suspected occurrence means that the species is not documented on land administered by the Forest Service, but may occur on the unit because: 1) the National Forest is considered to be within the species' range and 2) appropriate habitat is present; or 3) there is a known occurrence of the species (historic or current) in close enough vicinity that the species could occur on Forest Service land (ISSSSP 2011).

Additional desktop information on sensitive species occurrence is based on several data sources including data from the Oregon Biodiversity Information Center (ORBIC; 2012) and the Forest Service (2006), as well as from aerial photographs and other publically-available Geographical Information System (GIS) databases. Sources of habitat, range, status, threats, and natural history information for each species included: ISSSSP species fact sheets (ISSSSP 2014), NatureServe (2013), the Atlas of Oregon Wildlife (Csuti et al. 2001), Wildlife Habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001), as well as additional sources specific to the species (see Sections 6.2.1 to 6.2.8). Results of this review, including expected habitats and documented or suspected occurrences on Forest Service lands, are presented in Section 6.0 for species potentially impacted by the Project, and in Appendix A for species not expected to be impacted by the Project.

4.0 RESULTS OF FIELD SURVEYS

Biological surveys were conducted in the Project area by Siskiyou BioSurvey, LLC (SBS) and its subcontractors. Initial surveys were conducted in the spring of 2007. Additional surveys were conducted in 2008, 2010, and 2014 to account for minor route alternatives and to survey access roads and laydown areas, as well as to conduct persistence surveys for Survey and Manage species (Forest Service and BLM 2001, SBS 2011a, SBS 2011b, SBS 2011c, PCGP April 27, 2015 response to FERC data request).

Only Forest Service sensitive species are evaluated in this document; however, target species during surveys also included federal and state-listed threatened and endangered species and other special-status species. Special-status species groups included Bureau of Land Management (BLM) Oregon/Washington State Director Special Status Species, and Region 6 Survey and Manage species that included vascular plants, non-vascular plants, fungi, and mollusks. Forest Service sensitive species detected during the 2007, 2008, 2010, and/or 2014 surveys that are discussed in this BE include two terrestrial invertebrates (mollusks) and one vascular plant:

- Terrestrial Invertebrates:
    - Traveling sideband (*Monadenia fidelis celeuthia*); and
    - Siskiyou hesperian (*Vespericola sierranas*).
- Vascular plants:
    - Bellinger's meadowfoam (*Limnanthes floccosa* ssp. *bellingeriana*).

Additional federally-listed and proposed and Survey and Manage species that are also Forest Service sensitive species were documented during surveys. However, these species are discussed in the BA and Survey and Manage Species Persistence Evaluation, respectively, and are not discussed in this BE. However, the occurrence and impact determinations for these species are summarized in Table 1.

5.0 SPECIES IMPACT DETERMINATION SUMMARY

Table 1 lists the 260 Forest Service sensitive species that have been documented or are suspected to occur within the Umpqua, Rogue River, and/or Winema national forests based on the December 1, 2011 Regional Forester Special Status Species List (ISSSSP 2011). Where suitable habitat was documented for a species, but species-specific surveys were not conducted for that species, presence of the species was assumed and potential effects of the Project were analyzed based on the criteria presented below in Section 6.0.

One of four possible impact determinations are listed for each species: 1) No Impact (NI); 2) May Impact Individuals or Habitat but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (MIIH); 3) Will Impact Individuals or Habitat with a consequence that the action will contribute to a trend toward Federal listing or cause a loss of viability to the population or species (WOFV); or 4) Beneficial Impact (BI).

Of the 260 Forest Service sensitive species, 40 had impact determinations of MIIH. Of those, 32 are discussed in detail in Section 6.2, and the remaining 8 are discussed in more detail in the Survey and Manage Persistence Evaluation (Appendix K to the FEIS). Appendix A includes the species that were dropped from further analysis due to a lack of suitable habitat or because they were not detected during targeted field surveys. Appendix A additionally includes a description of suitable habitat, documented or suspected occurrence by National Forest, and a rationale for the impact determination for each species.

Federally-listed or proposed species that are also considered Forest Service sensitive species are included in Table 1 (2 mammals, 1 bird, 1 amphibian, 3 fish, and 4 plants). These species are addressed in detail in the BA. Impact determinations in Table 1 are those from the BA and thus do not use Forest Service terminology. Four possible impact determinations are shown for federally-listed or proposed species: 1) No effect (NE); 2) Not likely to adversely affect (NLAA); 3) Likely to adversely affect (LAA); and 4) Not likely to jeopardize the continued existence for proposed species (NJ).

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Mammals					
Pallid bat *Antrozous pallidus pacificus*	D – UMP [d/] D – RRS D – FWI	Y	N	U	MIIH
Red tree vole *Arborimus longicaudus* [b/]	D – UMP	Y	Y	Y	MIIH
Townsend's big-eared bat *Corynorhinus townsendii*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Fringed myotis *Myotis thysanodes*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Pygmy rabbit *Brachylagus idahoensis*	S – FWI	N	N	U	NI
North American wolverine *Gulo gulo luscus*	S – UMP S – RRS S – FWI	N	N	N	NI
Gray wolf *Canis lupus* [a/]	D – UMP [d/]	Y	N	U	NLAA
Pacific fisher *Martes pennanti* [a/]	D – UMP D – RRS D – FWI	Y	N	U	NJ/LAA
Birds					
Red-necked grebe *Podiceps grisegena*	D – UMP D – FWI	Y	N	U	MIIH
Horned grebe *Podiceps auritus*	D – UMP D – FWI	Y	N	U	MIIH
American white pelican *Pelecanus erythrorhynchos*	D – RRS [d/] D – FWI	Y	N	U	MIIH
Harlequin duck *Histrionicus histrionicus*	D – UMP D – RRS	Y	N	U	MIIH
Bufflehead *Bucephala albeola*	D – UMP D – FWI	Y	N	U	MIIH
Yellow rail *Coturnicops noveboracensis*	S – UMP D – FWI	N	N	U	NI
Upland sandpiper *Bartramia longicauda*	D – FWI	Y	N	U	MIIH
Bald eagle *Haliaeetus leucocephalus*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
American peregrine falcon *Falco peregrinus anatum*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Greater sage-grouse *Centrocercus urophasianus*	D – FWI	N	N	N	NI
Northern spotted owl *Strix occidentalis caurina* [a/]	D – UMP D – RRS D – FWI	Y	Y	Y	LAA

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Great gray owl *Strix nebulosa* [b/]	D – RRS	Y	Y	Y	MIIH
Black swift *Cypseloides niger*	D – UMP	N	N	U	NI
White-headed woodpecker *Picoides albolarvatus*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Lewis' woodpecker *Melanerpes lewis*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Purple martin *Progne subis*	S – UMP S – RRS S – FWI	Y	N	U	MIIH
Northern waterthrush *Seiurus noveboracensis*	D – RRS	N	N	N	NI
Tricolored blackbird *Agelaius tricolor*	D – RRS D – FWI	Y	N	U	MIIH
Amphibians					
Siskiyou Mountains salamander *Plethodon stormi* [b/]	D – RRS	N	N	N	NI
Black salamander *Aneides flavipunctatus*	D – RRS	N	N	N	NI
California slender salamander *Batrachoseps attenuates*	D – RRS	N	N	N	NI
Foothill yellow-legged frog *Rana boylii*	D – UMP D – RRS	Y	N	U	MIIH
Northern leopard frog *Lithobates pipiens*	S – FWI	N	N	N	NI
Oregon spotted frog *Rana pretiosa* [a/]	S – UMP S – RRS D – FWI	Y	N	U	NLAA
Columbia spotted frog *Rana luteiventris*	S – FWI	N	N	U	NI
Reptiles					
Western pond turtle *Actinemys marmorata* (formerly Pacific pond turtle)	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Non-anadromous Fish					
Umpqua chub *Oregonichthys kalawatseti*	D – UMP	Y	N	U	MIIH
Upper Klamath redband trout *Oncorhynchus mykiss newberrii*	D – FWI	Y	N	U	MIIH

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Anadromous Fish					
Chinook salmon *Oncorhynchus tshawytscha* Southern Oregon t/Northern California Coastal ESU, Fall-run, Spring-run	D – RRS	N	N	N	NI
Chum salmon *Onocorhynchus keta* Pacific Coast ESU	I – UMP I – RRS	N	N	N	NI
Steelhead *Oncorynchus mykiss* Oregon Coast ESU	D – UMP D – RRS	N	N	N	NI
Coho salmon *Oncorhynchus kisutch* Southern Oregon/Northern California Coast ESU Rogue (and Klamath) SMU [a/]	D – RRS	Y	N	U	LAA
Coho salmon *Oncorhynchus kisutch* Oregon Coast ESU Coastal SMU [a/]	D – UMP D – RRS	Y	N	U	LAA
Green sturgeon *Acipenser medirostris* Southern DPS [a/]	I – RRS	Y	N	U	LAA
Terrestrial Invertebrates					
Evening fieldslug *Deroceras hesperium* [b/]	S – RRS D – FWI	Y	Y	Y	MIIH
Chace sideband *Monadenia chaceana* [b/]	D – UMP D – RSS S – FWI	Y	Y	Y	MIIH
Green sideband *Monadenia fidelis beryllica*	D – RRS	Y	Y	N	NI
Traveling sideband *Monadenia fidelis celeuthia*	D – RRS D – FWI [d/] D – UMP [d/]	Y	Y	Y	MIIH
Modoc sideband *Monadenia fidelis* ssp. *Nov.*	D – FWI	Y	Y	N	NI
Crater Lake tightcoil *Pristiloma arcticum crateris* [b/]	D – UMP D – RRS D – FWI	Y	Y	N	NI
Siskiyou hesperian *Vespericola sierranas*	D – UMP [d/] D – RRS D – FWI	Y	Y	Y	MIIH
Franklin's bumblebee *Bombus franklini*	D – UMP [d/] D – RRS	Y	N	U	MIIH
Western bumblebee *Bombus occidentalis*	D – UMP D – RRS D – FWI	Y	N	U	MIIH

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Siskiyou short-horned grasshopper *Chloealtis aspasma*	S – UMP D – RRS	Y	N	U	MIIH
Gray-blue butterfly *Plebejus podarce*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Seaside hoary elfin butterfly *Callophrys polios maritima* (formerly hoary elfin)	S – RRS	Y	N	U	NI
Johnson's hairstreak *Callophrys johnsoni*	D – UMP D – RRS D – FWI	Y	N	U	MIIH
Insular blue butterfly *Plebejus saepiolus littoralis*	S – RRS	N	N	U	NI
Mardon skipper *Polites mardon*	S – UMP D – RRS D – FWI	Y	N	U	MIIH
Leona's little blue butterfly *Philotiella leona*	D – FWI	N	N	N	NI
Coronis fritillary *Speyeria coronis coronis*	D – UMP D – RRS	Y	N	U	MIIH
California shield-backed bug *Vanduzeeina borealis californica*	S – UMP S – RRS	N	N	N	NI
Aquatic Invertebrates					
Turban pebblesnail *Fluminicola turbinformis*	D – FWI	Y	Y	N	NI
Western ridged mussel *Gonidea angulata*	S – UMP S – RRS D – FWI	Y	N	U	MIIH
Great Basin ramshorn *Helisoma newberryi newberryi*	D – FWI	Y	Y	N	NI
Highcap lanx *Lanx alta*	D – RRS D – FWI	N	N	N	NI
Scale lanx *Lanx klamathensis*	S – RRS D – FWI	Y	Y	N	NI
Rotund lanx *Lanx subrotunda*	D – UMP D – FWI	Y	Y	N	NI
A caddisfly (no common name) *Namamyia plutonis*	S – UMP D – RRS S – FWI	Y	N	U	MIIH
Montane peaclam *Pisidium ulttramontanum*	D – FWI	N	N	N	NI
Robust walker *Pomatiopsis binneyi*	D – RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Pacific walker *Pomatiopsis californica*	S – RRS	N	N	N	NI
Archimedes springsnail *Pyrgulopsis archimedis*	D – FWI	Y	N	U	MIIH
Haddock's Rhyacophilan caddisfly *Rhyacophila haddocki*	D – RRS	Y	N	U	NI
Lined ramshorn *Vorticifex effusa diagonalis*	D – FWI	N	N	U	NI
Vascular Plants					
California maiden-hair *Adiantum jordanii*	S – UMP D – RRS S – FWI	Y	Y	N	NI
Peninsular onion *Allium peninsulare*	S – RRS	Y	Y	N	NI
Crater Lake rock-cress *Arabis suffrutescens* var. *horizontalis*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Gasquet (hairy) manzanita *Arctostaphylos hispidula*	D – RRS	N	N	N	NI
Shasta arnica *Arnica viscosa*	D – UMP S – RRS D – FWI	Y	Y	N	NI
Grass-fern *Asplenium septentrionale*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Lemmon's milkvetch *Astragalus lemmonii*	D – FWI	Y	Y	N	NI
Bensonia *Bensoniella oregana*	D – RRS	Y	Y	N [e/]	NI
Crenulate moonwort (Crenulate grape-fern) *Botrychium crenulatum*	S – FWI	Y	Y	N	NI
Brewer's reedgrass *Calamagrostis breweri*	S – UMP	Y	Y	N	NI
Greene's mariposa-lily *Calochortus greenei*	S – FWI	Y	Y	N	NI
Howell's camassia *Camassia howellii*	D- RRS	N	N	N	NI
Slender-flowered evening primrose *Camissonia graciliflora*	D- RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Capitate sedge *Carex capitata*	D – RRS D – FWI	Y	Y	N	NI
Bristly sedge *Carex comosa*	S – RRS	Y	Y	N	NI
Cordilleran sedge *Carex cordillerana*	D – FWI	Y	Y	N	NI
Crawford's sedge *Carex crawfordii*	S – UMP S – RRS	Y	Y	N	NI
Lesser panicled sedge *Carex diandra*	S – UMP D – FWI	Y	Y	N	NI
A sedge *Carex klamathensis*	D – RRS	Y	Y	N	NI
Slender sedge *Carex lasiocarpa* var. *americana*	S – UMP D – FWI	Y	Y	N	NI
Spikenard sedge *Carex nardina*	D – UMP	Y	Y	N	NI
Sierra nerved sedge *Carex nervina*	D – RRS	Y	Y	N	NI
Russet sedge *Carex saxatilis*	S – FWI	Y	Y	N	NI
Native sedge *Carex vernacula*	S – UMP D – FWI	Y	Y	N	NI
Green-tinged paintbrush *Castilleja chlorotica*	D – FWI	N	N	N	NI
Split-hair paintbrush *Castilleja schizotricha*	D – RRS	N	N	N	NI
Coville's lip-fern *Cheilanthes covillei*	D – RRS	Y	Y	N	NI
Fee's lip-fern *Cheilanthes feei*	S – FWI	Y	Y	N	NI
Coastal lip-fern *Cheilanthes intertexta*	S – RRS S – FWI	Y	Y	N	NI
Narrow-leaved amole *Chlorogalum angustifolium*	S – RRS	Y	Y	N	NI
Oregon timwort *Cicendia quadrangularis*	D – RRS	Y	Y	N	NI
Mt. Mazama collomia *Collomia mazama*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Milo baker's cryptantha *Cryptantha milobakeri*	D – RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Baker's cypress *Cupressus bakeri*	D – RRS	Y	Y	N	NI
Short-pointed cyperus *Cyperus acuminatus*	S – RRS	Y	Y	N	NI
Clustered lady's slipper *Cypripedium fasciculatum* [b/]	D – UMP D – RSS	Y	Y	Y	MIIH
Red larkspur *Delphinium nudicaule*	D – RRS	Y	Y	N	NI
Few-flowered bleedingheart *Dicentra pauciflora*	D – RRS	Y	Y	N	NI
Howell's whitlow-grass *Draba howellii*	D – RRS	Y	Y	N	NI
Short seeded waterwort *Elatine brachysperma*	S – UMP S – FWI	Y	Y	N	NI
Bolander's spikerush *Eleocharis bolanderi*	D – FWI	Y	Y	N	NI
Oregon willow herb *Epilobium oreganum*	D – RRS	N	N	N	NI
Siskiyou willow herb *Epilobium siskiyouense*	D – RRS	N	N	N	NI
Golden fleece *Ericameria arborescens*	D – RRS	Y	Y	N	NI
Siskiyou daisy *Erigeron cervinus*	D – RRS	Y	Y	N	NI
Cliff (rock) daisy *Erigeron petrophilus*	D – RRS	Y	Y	N	NI
Lobb's buckwheat *Eriogonum lobbii*	D – RRS	Y	Y	N	NI
Prostrate buckwheat *Eriogonum prociduum*	D – FWI	Y	Y	N	NI
Green buckwheat *Eriogonum umbellatum* var. *glaberrimum*	D – FWI	Y	Y	N	NI
Howell's adder's tongue *Erythronium howellii*	D – RRS	Y	Y	N	NI
Gold poppy *Eschscholzia caespitosa*	S – RRS	N	N	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Wayside aster [b/] *Eucephalus vialis*	S – UMP D – RRS	Y	Y	Y	MIIH
Umpqua swertia *Frasera umpquaensis*	D – UMP D – RRS	Y	Y	N	NI
Gentner's fritillary *Fritillaria gentner* [a/]	D – RSS	Y	Y	Y	LAA
Warner Mt. bedstraw *Galium serpenticum* ssp. *warnerense*	D – FWI	Y	Y	N	NI
Newberry's gentian *Gentiana newberryi* var. *newberryi*	S – UMP S – RRS D – FWI	Y	Y	N	NI
Elegant gentian *Gentiana plurisetosa*	D – RRS	Y	Y	N	NI
Waldo gentian *Gentiana setigera*	D – RRS	Y	Y	N	NI
Beautiful stickseed *Hackelia bella*	S – RRS	Y	Y	N	NI
Salt heliotrope *Heliotropium curassavicum*	D – FWI	N	N	N	NI
Shaggy hawkweed *Hieracium horridum*	S – RRS	Y	Y	N	NI
Henderson's horkelia *Horkelia hendersonii*	D – RRS	N	N	N	NI
Three-toothed horkelia *Horkelia tridentata* ssp. *tridentata*	D – RRS	N	N	N	NI
California globe-mallow *Iliamna latibracteata*	D – UMP D – RRS	Y	Y	N	NI
Shockley's ivesia *Ivesia shockleyi*	D – FWI	Y	Y	N	NI
Fragrant kalmiopsis *Kalmiopsis fragrans*	D – UMP	Y	Y	N	NI
Bush beardtongue *Keckiella lemmonii*	D – RRS	Y	Y	N	NI
Columbia lewisia *Lewisia columbiana* var. *columbiana*	D – UMP	Y	Y	N	NI
Lee's lewisia *Lewisia leana*	S – UMP D – RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Bellinger's meadowfoam *Limnanthes floccosa* ssp. *bellingeriana*	D – RRS	Y	Y	Y	MIIH
Slender meadow-foam *Limnanthes gracilis* ssp. *gracilis*	D – UMP [d/] S – RRS	Y	Y	N	NI
Aristulate lipocarpha *Lipocarpha aristulata*	S – FWI	Y	Y	N	NI
Cook's lomatium *Lomatium cookii* [a/]	S – RSS	Y	N	N	NLAA
Englemann's desert-parsley *Lomatium engelmannii*	D – RRS	N	N	N	NI
Stipuled trefoil *Lotus stipularis*	D – RRS	Y	Y	N	NI
Mt. Ashland lupine *Lupinus lepidus* var. *ashlandensis*	D – RRS	N	N	N	NI
Kincaid's lupine *Lupinus sulphureus* var. *kincaidii* [a/]	D – UMP	Y	Y	Y	NE
Tracy's lupine *Lupinus tracyi*	D – RRS	Y	Y	N	NI
Bog club-moss *Lycopodiella inundata*	D – FWI	Y	Y	N	NI
White meconella (fairy poppy) *Meconella oregana*	S – RRS	Y	Y	N	NI
Bolander's monkeyflower *Mimulus bolanderi*	D – RRS	Y	Y	N	NI
Congdon's monkeyflower *Mimulus congdonii*	S – RRS	Y	Y	N	NI
Disappearing monkeyflower *Mimulus evanescens*	D – FWI	N	N	N	NI
Tri-colored monkeyflower *Mimulus tricolor*	D – FWI	Y	Y	N	NI
Annual dropseed *Muhlenbergia minutissima*	S – FWI	Y	Y	N	NI
Slender nemacladus *Nemacladus capillaris*	S – RRS	Y	Y	N	NI
Adder's-tongue *Ophioglossum pusilum*	D – UMP D – RRS	Y	Y	N	NI
Coffee fern *Pellaea andromedifolia*	D – UMP S – RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Bird's-foot fern *Pellaea mucronata* ssp. *mucronata*	S – RRS	Y	Y	N	NI
Blue-leaved penstemon *Penstemon glaucinus*	D – FWI	Y	Y	N	NI
Red-rooted yampah *Perideridia erythrorhiza*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Siskiyou phacelia *Phacelia leonis*	D – RRS	Y	Y	N	NI
American pillwort *Pilularia americana*	S – RRS S – FWI	Y	Y	N	NI
Whitebark pine *Pinus albicaulis*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Coral seeded allocarya *Plagiobothrys figuratus* var. *corallicarpus*	S – RRS	Y	Y	N	NI
Greene's popcorn flower *Plagiobothrys greenei*	S – RRS	Y	Y	N	NI
Rough popcorn flower *Plagiobothrys hirtus* a/	S – UMP	Y	Y	N	NLAA
Desert allocarya *Plagiobothrys salsus*	S – FWI	Y	Y	N	NI
Timber bluegrass *Poa rhizomata*	S – UMP S – RRS	Y	Y	N	NI
Profuse-flowered mesa mint *Pogogyne floribunda*	S – FWI	Y	Y	N	NI
California sword-fern *Polystichum californicum*	D – UMP S – RRS	Y	Y	N	NI
Rafinesque's pondweed *Potamogeton diversifolius*	S – FWI	Y	Y	N	NI
California chicory *Rafinesquia californica*	S – RRS	Y	Y	N	NI
Redberry *Rhamnus ilicifolia*	D – RRS	Y	Y	N	NI
Straggly gooseberry *Ribes divaricatum* var. *pubiflorum*	S – RRS	Y	Y	N	NI
Thompson's mistmaiden *Romanzoffia thompsonii*	D – UMP D – RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Columbia cress *Rorippa columbiae*	S – RRS D – FWI	Y	Y	N	NI
Lowland toothcup *Rotala ramosior*	S – UMP S – FWI	Y	Y	N	NI
Joint-leaved saxifrage *Saxifragopsis fragarioides*	D – RRS	Y	Y	N	NI
Scheuchzeria *Scheuchzeria palustris* ssp. *americana*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Water clubrush *Schoenoplectus subterminalis* (formerly *Scirpus subterminalis*)	D – UMP D – RRS D – FWI	Y	Y	N	NI
Drooping bulrush *Scirpus pendulus*	D – RRS	Y	Y	N	NI
California fetid adderstongue *Scoliopus bigelovii*	D – RRS	Y	Y	N	NI
Rogue river stonecrop *Sedum moranii*	D – RRS	Y	Y	N	NI
Verrucose sea-purslane *Sesuvium verrucosum*	S – FWI	Y	Y	N	NI
Coast checkermallow *Sidalcea malviflora patula*	D – RRS	Y	Y	N	NI
Bolander's catchfly *Silene hookeri bolanderi*	D – RRS	Y	Y	N	NI
Parish's horse-nettle *Solanum parishii*	D – RRS	Y	Y	N	NI
Western sophora *Sophora leachiana*	D – RRS	Y	Y	N	NI
Common jewel flower *Streptanthus glandulosus*	S – RRS	Y	Y	N	NI
Howell's streptanthus *Streptanthus howellii*	D – RRS	Y	Y	N	NI
Howell's tauschia *Tauschia howellii*	D – RRS	N	N	N	NI
Short-podded thelypody *Thelypodium brachycarpum*	D – FWI	N	N	N	NI
Siskiyou trillium *Trillium kurabayashii*	D – RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
Lesser bladderwort *Utricularia minor*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Northern bladderwort *Utricularia ochroleuca*	S – UMP S – FWI	Y	Y	N	NI
Western bog violet *Viola primulifolia* ssp. *occidentalis*	D – RRS	N	N	N	NI
Dotted water-meal *Wolffia borealis*	S – UMP	Y	Y	N	NI
Columbia water-meal *Wolffia columbiana*	S – UMP S – RRS	Y	Y	N	NI
Small-flowered death camas *Zigadenus fontanus*	S-RRS	Y	Y	N	NI
Fungi					
Albatrellus avellaneus [b/ c/]	D – RSS	Y	Y	N	NI
Arcangeliella camphorata [b/ c/]	D – RSS	Y	Y	N	NI
Boletus pulcherrimus [b/ c/]	D – UMP D – RSS D – FWI	Y	Y	Y	MIIH
Chamonixia caespitosa [b/ c/]	D – RSS	Y	Y	N	NI
*Cortinarius barlowensis (*syn. *Cortinarius azureus)* [b/ c/]	D – UMP	Y	Y	N	NI
Dermocybe humboldtensis [b/ c/]	S – UMP S – RSS	Y	Y	N	NI
Gastroboletus vividus [b/ c/]	S – UMP D – RSS S – FWI	Y	Y	N	NI
Gymnomyces fragrans	S – UMP D – RRS	Y	Y	N	NI
Hygrophorus caeruleus [b/ c/]	D – UMP D – RSS D – FWI	Y	Y	Y	MIIH
*Pseudorhizina californica (*formerly *Gyromitra californica)* [b/ c/]	D – UMP D – RSS D – FWI	Y	Y	N	NI
Ramaria amyloidea [b/ c/]	D – UMP S – RSS	Y	Y	N	NI
Ramaria spinulosa var. *diminutiva* [b/ c/]	S – UMP S – RSS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Rhizopogon chamaleontinus b/ c/	D – RSS	Y	Y	N	NI
Rhizopogon ellipsosporus b/ c/	D – RSS	Y	Y	N	NI
Rhizopogon exiguus b/ c/	S – UMP D – RSS	Y	Y	N	NI
Rhizopogon inquinatus b/ c/	S – UMP	Y	Y	N	NI
Stagnicola perplexa b/ c/	S – UMP D – RSS	Y	Y	N	NI
Lichen					
Bryoria subcana b/ c/	S – RSS	Y	Y	N	NI
Shield lichen *Heterodermia leucomelos*	S – RRS	Y	Y	N	NI
Leptogium cyanescens b/ c/	S – UMP S – RSS S – FWI	Y	Y	N	NI
Lobaria linita b/ c/	D – UMP S – RSS	Y	Y	N	NI
Pseudocyphellaria mallota c/	D – UMP	Y	Y	N	NI
Ramalina pollinaria b/ c/	S – UMP S – RSS	Y	Y	N	NI
Woven spore lichen *Texosporium sancti-jacobi*	S – FWI	Y	Y	N	NI
Bryophytes					
Tiny Notchwort *Anastrophyllum minutum*	S – UMP S – RRS S – FWI	Y	Y	N	NI
Broad-leaved lantern moss *Andreaea schofieldiana*	S – UMP D – RRS	N	N	N	NI
Spidery threadwort *Blepharostoma arachnoideum*	D – UMP	Y	Y	N	NI
Giant fourpoint *Barbilophozia lycopodioides*	S – FWI	Y	Y	N	NI
Beautiful bryum *Bryum calobryoides*	S – UMP D – RRS	Y	Y	N	NI

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project

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Bog pouchwort *Calypogeia sphagnicola*	D – UMP D – RRS	N	N	N	NI
Spiny threadwort *Cephaloziella spinigera*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Racomitrium moss *Codriophorus depressus (*formerly *Racomitrium depressum)*	S – UMP S – RRS S – FWI	Y	Y	N	NI
Cryptomitrium tenerum	D – RRS	Y	Y	N	NI
White-mouthed Extinguisher-moss *Encalypta brevicollis*	S – UMP D – RRS	Y	Y	N	NI
Candle snuffer moss *Encalypta brevipes*	S – UMP D – RRS	N	N	N	NI
Banded cord-moss *Entosthodon fascicularis*	S – UMP S – RRS	Y	Y	N	NI
Braided frostwort *Gymnomitrion concinnatum*	S – UMP	Y	Y	N	NI
Great mountain flapwort *Harpanthus flotovianus*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Blandow's feather moss *Helodium blandowii*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Gillman's pawwort *Lophozia gillmanii*	S – UMP S – FWI	Y	Y	N	NI
Marsupella emarginata var. *aquatica* b/,c/	S – UMP	Y	Y	N	NI
Meesia moss *Meesia uliginosa*	S – UMP D – RRS D – FWI	Y	Y	N	NI
Orthodontium gracile b/ c/	D – RSS	Y	Y	N	NI
Translucent orthodontium *Orthodontium pellucens*	D – RRS	N	N	N	NI
Tuberous hornwort *Phymatoceros phymatodes*	S – RRS	Y	Y	N	NI
Dwarf rock haircap *Polytrichum sphaerothecium*	S – UMP S – FWI	Y	Y	N	NI
Bolander's scalemoss *Porella bolanderi*	S – UMP D – RRS	Y	Y	N	NI

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Common Name and/or Scientific Name[1/]	Documented or Suspected Occurrence Within Forest[2/]	Potential Habitat[3/]	Surveys Performed[4/]	Species Present[5/]	Impact Determination[6/]
Blunt water moss *Pseudocalliergon trifarium* (formerly *Calliergon trifarium*)	S – RRS D – FWI	N	N	N	NI
Schistidium moss *Schistidium cinclidodonteum*	S – RRS S – FWI	Y	Y	N	NI
Schistostega pennata [b/ c/]	D – UMP S – RSS S – FWI	Y	Y	N	NI
Alpine masterwort *Schofieldia monticola*	S – UMP	Y	Y	N	NI
Purple-vased stink moss *Splachnum ampullaceum*	S – UMP S – RRS D – FWI	Y	Y	N	NI
Tetraphis geniculata [b/ c/]	S – UMP	Y	Y	N	NI
Tomentypnum moss *Tomentypnum nitens*	D – UMP D – RRS D – FWI	Y	Y	N	NI
Mucronleaf tortula moss *Tortula mucronifolia*	D – RRS	Y	Y	N	NI
Asano's trematodon moss *Trematodon asanoi*	S – UMP S – FWI	Y	Y	N	NI
Tritomaria exsectiformis [b/ c/]	D – UMP S – RSS D – FWI	Y	Y	N	NI

General Notes

1/ Sensitive species located in the Project area were documented by SBS (2008, 2010, 2011a, 2011b, 2011c), and in PCGP's April 27, 2015 response to FERC data request. Forest Service sensitive species that are also Survey and Manage species were documented; however, these species are not discussed here but are included in the Survey and Manage Report submitted as a stand-alone document.

ESU = Evolutionarily Significant Unit

2/ Occurrence Key:

National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest

D = Documented occurrence = A species located on land administered by the Forest Service based on historic or current known sites of a species reported by a credible source for which the Forest Service has knowledge of written, mapped or specimen documentation of the occurrence.

S = Suspected occurrence = Species is not documented on land administered by the Forest Service, but may occur on the unit because: 1) National Forest is considered to be within the species' range and 2) appropriate habitat is present or 3) known occurrence of the species (historic or current) in vicinity such that the species could occur on FS land.

I = Downstream Influence by Forest Service Actions

Note: ISSSSP 2011 lists documented and suspected occurance status by grouping Fremont-Winema national forests together, and Rogue River-Siskiyou national forests together. We are assuming that this status information pertains to the forests crossed by the Project.

3/ Potential Habitat: Y = Yes, suitable habitat present; N = no suitable habitat present

4/ Surveys Performed: Y = Yes, surveys were conducted; N = No surveys were conducted for the species.

5/ Species Present: Y = Yes; N = No; U = Unknown because no targetted surveys were conducted for the species.

6/ Impact Determination: NI = No Impact, MIIH = May Impact Individuals or Habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species. For federally-listed or proposed species: NE=No effect, NLAA= Not likely to adversely affect, LAA= Likely to adversely affect, NJ = not likely to jeopardize the continued existence for proposed species.

Species-Specific Notes

a/ Denotes listing under ESA as endangered or threatened, or a species proposed for ESA listing. Full analysis can be found in the BA for this project.

b/ Denotes a species on the Survey and Manage list under the Northwest Forest Plan. These species are analyzed in Appendix K, Survey and Manage Species Persistence Evaluation.

c/ No common name found for this species.

Table 1. Forest Service Sensitive Species with Potential to Occur near the Project					
Common Name and/or Scientific Name[1/]	**Documented or Suspected Occurrence Within Forest[2/]**	**Potential Habitat[3/]**	**Surveys Performed[4/]**	**Species Present[5/]**	**Impact Determination[6/]**
d/ Documented based on recent observations. e/ Detected on BLM-managed lands but not on Forest Service-managed lands crossed by the Project.					

1

6.0 DETAILED EFFECTS OF PROPOSED ACTION ON SPECIES CONSIDERED

6.1 Global Discussion

6.1.1 Analysis Areas and Current Environment

In order to characterize the current environment for each species, buffers of 700 feet and 3,200 feet were applied to the proposed action, and acreages of each habitat type were calculated. To characterize past actions in forested environments, seral stage (0-40 years, 40-80 years, and greater than 80 years) was assigned to all forested types within the buffer area. In non-forested habitat types, acreages were given for existing habitats within the buffered area. These buffers were analyzed using a combination of Johnson and O'Neil (2001) habitat types, Gap Analysis Project (GAP) data, aerial photographs, and other available data, including late-successional old growth coverage (BLM 2008, ORNHIC and The Wetland Conservancy 2009, USGS 2011).

The 700-foot buffer was used as the analysis area for species that could potentially be impacted by edge effect, but would not likely be impacted by noise or other long-ranging effects (Table 2). The species evaluated using the 700-foot buffer include two terrestrial invertebrates (traveling sideband and Siskiyou hesperian; Section 6.2.6), and vascular plants (Section 6.2.8). Fundamental changes in the microclimate of a stand, humidity and strong winds in particular, have been recorded at distances greater than 700 feet from the forest edge in late-successional Douglas-fir forests (Chen et al. 1995). Approximately 62 percent of forested National Forest lands within the 700-foot buffer have been harvested within the last 80 years (41 percent 0-40 years, 21 percent 40-80 years), leaving approximately 38 percent late-successional forest (Table 2).

Table 2. Available Habitat within 700 feet of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	**Forest-Woodland Age Category[1/]**	**National Forest**			**Other Federal [2/]**	**Non-Federal**	**Overall Total**
		Umpqua	**Rogue River**	**Winema**			
Forest – Woodland							
Westside Lowland Conifer-Hardwood-Forest	L-O	0	0	0	721	108	830
	M-S	0	0	0	947	1,288	2,235
	C-R	0	0	0	530	4,003	4,533
	Total	0	0	0	2,199	5,399	7,598
Montane Mixed Conifer Forest	L-O	0	33	56	108	0	197
	M-S	0	23	7	0	53	83
	C-R	0	48	115	0	24	187
	Total	0	104	179	108	77	467
Southwest Oregon Mixed Conifer-Hardwood Forest	L-O	921	443	104	2,042	685	4,195
	M-S	790	186	28	388	3,447	4,838
	C-R	384	317	27	1,051	3,331	5,110
	Total	2,094	945	160	3,480	7,463	14,143
Ponderosa Pine Forest and Woodlands	L-O	0	0	66	707	84	857
	M-S	0	0	24	101	610	736
	C-R	0	0	67	245	984	1,297
	Total	0	0	157	1,053	1,679	2,890
Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O	0	0	0	241	103	343
	M-S	0	0	0	39	281	321
	C-R	0	0	0	78	803	881
	Total	0	0	0	357	1,187	1,545
Western Juniper and Mountain Mahogany Woodlands	L-O	0	0	0	46	0	46
	M-S	0	0	0	7	656	663
	C-R	0	0	0	0	316	316
	No Age	0	0	0	12	231	243
	Total	0	0	0	65	1,203	1,268
Other Forested-Woodland Habitat[3/]	L-O	0	488	61	36	48	634
	M-S	0	80	101	8	474	663
	C-R	12	732	656	117	2,744	4,260
	Total	12	1,300	818	161	3,265	5,556
Forest-Woodland Subtotal	L-O	921	964	287	3,901	1,028	7,101
	M-S	790	289	161	1,491	6,809	9,539
	C-R	396	1,097	866	2,020	12,204	16,583
	No Age	0	0	0	12	231	243
	Total	**2,107**	**2,350**	**1,314**	**7,424**	**20,272**	**33,466**

Table 2. Available Habitat within 700 feet of the Proposed Action

Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest			Other Federal [2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			
Non-Forested Habitat							
Shrub-Steppe	N/A	0	9	0	124	1,040	1,173
Westside Grasslands[4/]	N/A	0	11	0	46	905	962
Eastside Grasslands[4/]	N/A	0	1	2	2	173	178
Herbaceous Wetlands		1	0	19	5	559	583
Westside Riparian Wetlands		1	8	0	1	136	147
Eastside Riparian Wetlands		0	0	17	0	0	17
Agriculture, Pastures and Mixed Environs	N/A	0	0	0	417	10,707	11,124
Developed-Urban and Mixed Environs	N/A	12	16	0	5	1,676	1,708
Coastal Dunes and Beaches		0	2	0	0	0	2
Roads	N/A	30	25	31	83	551	720
Open Water-Lakes, Rivers, and Streams	N/A	4	5	39	59	1,116	1,222
Bays and Estuaries	N/A	0	0	0	0	382	382
Other Non-Forest Habitat[5/]	N/A	18	9	11	56	144	237
Non-Forest Subtotal		**66**	**85**	**118**	**798**	**17,388**	**18,456**
Total Overall Habitat[6/]	L-O	921	964	287	3,901	1,028	7,101
	M-S	790	289	161	1,491	6,809	9,539
	C-R	396	1,097	866	2,020	12,204	16,583
	No Age	0	0	0	12	231	243
	Non-Forest	66	85	118	798	17,388	18,456
	Total	**2,172**	**2,435**	**1,432**	**8,222**	**37,660**	**51,921**

1/ Forest-Woodland Age Categories are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old; Age classes were determined by using BLM modeling developed for the Western Oregon Plan Revision (http://www.blm.gov/or/plans/wopr/data/final/data-details.php?id=199).
2/ Other Federal Lands include Bureau of Reclamation, U.S. Fish and Wildlife Service Lands, GSA Lands, BLM Lands, and other NFS lands not crossed by the proposed Project.
3/ Other Forest-Woodland Habitat: delineation and available GIS data sources indicate that the area is forested but Johnson & O'Neil, 2001 GIS database identified the area as non-forested. Forested habitats that were not included in the Habitat Categories above were also included in this category.
4/ Grasslands were only delineated within a variable approximately 2000 foot Project corridor; outside this corridor, grasslands are included in the Agriculture and Pastures category.
5/ Other Non-Forest Habitat: delineation and available GIS data sources indicate that the area is not forested but Johnson & O'Neil, 2001 GIS database identified the area as forested.
6/ Forested wetlands are included in this overall total by seral stage, and not in the overall non-forest total presented here.

1

The 3,200-foot buffer was used as the analysis area for species that could potentially be impacted by noise from construction of the proposed pipeline in addition to edge effects (Table 3). The species evaluated using the 3,200-foot buffer included all bats (Section 6.2.1), birds (Section 6.2.2), amphibians (Section 6.2.3), reptiles (Section 6.2.4), and the terrestrial invertebrates except the traveling sideband and Siskiyou hesperian (Section 6.2.6). The 3,200-foot buffer was applied as the distance at which noise produced from construction of the proposed pipeline would likely attenuate to background levels. The distance estimate is based on the following assumptions:

- Maximum noise anticipated during construction is likely to be 99 dB at 50 feet during ditching through rock and includes mitigated blasting (see Section 6.1.2.4).
- Ambient noise within the analysis area is 40 dB, as assumed in the Olympic National Forest (FWS 2003).
- Detectability threshold for sensitive species (NSO or marbled murrelet) is 4 dB above baseline noise level (FWS 2003).
- Noise attenuates by 7.5 dB per doubling of distance from sources based on soft site reduction assumptions (WSDOT 2008)
- More than likely there are 200 feet of dense vegetation (timber) between the noise source and noise-sensitive target (distance at which noise attenuates to 44 dB). Maximum influence of vegetation is a 10-dB reduction between source and receptor (WSDOT 2008).

A-weighted decibels (dBA) are used to account for the relative loudness perceived by the human ear, presumed to also apply to most animals, as the ear is less sensitive to low audio frequencies. Therefore, 3,200 feet on each side of the Project has been used to define a zone of Project effects for the effects analysis. With these assumptions, a noise of 99 dBA at 50 feet would attenuate to 44 dBA at 3,200 feet from the edge of the construction ROW.

Approximately 58 percent of forested National Forest lands within the 3,200-foot buffer have been harvested within the last 80 years (47 percent 0-40 years, 11 percent 40-80 years), leaving approximately 42 percent late-successional forest (Table 3).

1

Table 3. Available Habitat within 3,200 feet of the Proposed Action							
Habitat Category (Johnson and O'Neil, 2001)	**Forest-Woodland Age Category[1/]**	**National Forest**			**Other Federal[2/]**	**Non-Federal**	**Overall Total**
		Umpqua	**Rogue River**	**Winema**			
Forest – Woodland							
Westside Lowland Conifer-Hardwood-Forest	L-O	0	0	0	3,841	607	4,448
	M-S	0	0	0	4,942	6,633	11,574
	C-R	0	0	0	2,911	14,465	17,376
	Total	**0**	**0**	**0**	**11,694**	**21,705**	**33,399**
Montane Mixed Conifer Forest	L-O	551	33	56	397	0	1,037
	M-S	0	23	7	0	187	217
	C-R	0	48	115	0	24	187
	Total	**551**	**104**	**179**	**397**	**211**	**1,441**
Southwest Oregon Mixed Conifer-Hardwood Forest	L-O	4,310	1,744	205	9,325	4,415	20,000
	M-S	1,956	344	28	1,890	7,533	11,751
	C-R	2,072	1,292	29	3,685	18,948	26,025
	Total	**8,339**	**3,380**	**262**	**14,900**	**30,895**	**57,776**
Ponderosa Pine Forest and Woodlands	L-O	0	0	275	3,687	345	4,307
	M-S	0	0	57	561	37,78.86	618
	C-R	0	0	626	795	6,488	7,909
	Total	**0**	**0**	**958**	**5,042**	**6,833**	**12,833**
Westside Oak and Dry Douglas-fir Forest and Woodlands	L-O	0	0	0	887	633	1,520
	M-S	0	0	0	132	572	704
	C-R	0	0	0	209	3,052	3,261
	Total	**0**	**0**	**0**	**1,228**	**4,257**	**5,485**
Western Juniper and Mountain Mahogany Woodlands	L-O	0	0	0	199	8	207
	M-S	0	0	0	51	844	895
	C-R	0	0	0	0	1,314	1,314
	No Age	0	0	0	78	2,596	2,675
	Total	**0**	**0**	**0**	**328**	**4,763**	**5,091**
Other Forested-Woodland Habitat[3/]	L-O	0	2,623	556	304	433	3,915
	M-S	14	217	149	63	1,383	1,826
	C-R	190	4,448	2,946	756	15,841	24,180
	Total	**203**	**7,288**	**3,651**	**1,123**	**17,657**	**29,922**
Forest-Woodland Subtotal	L-O	4,861	4,400	1,092	18,640	6,440	35,434
	M-S	1,970	584	242	7,640	17,152	27,586
	C-R	2,262	5,787	3,716	8,355	60,133	80,252
	No Age	0	0	0	78	2,596	2,675
	Total	**9,092**	**10,771**	**5,049**	**34,713**	**86,321**	**145,948**

Table 3. Available Habitat within 3,200 feet of the Proposed Action

Habitat Category (Johnson and O'Neil, 2001)	Forest-Woodland Age Category[1/]	National Forest			Other Federal[2/]	Non-Federal	Overall Total
		Umpqua	Rogue River	Winema			
Non-Forested Habitat							
Shrub-Steppe	N/A	0	9	0	159	3,909	4,077
Westside Grasslands[4/]	N/A	0	11	0	60	1,616	1,687
Eastside Grasslands[4/]	N/A	0	1	2	2	162	167
Herbaceous Wetlands	N/A	1	0	27	10	1,680	1,718
Westside Riparian Wetlands	N/A	6	34	0	8	643	690
Eastside Riparian Wetlands	N/A	0	0	224	13	96	333
Agriculture, Pastures and Mixed Environs	N/A	0	0	0	2,191	50,198	52,389
Developed-Urban and Mixed Environs	N/A	12	16	0	48	5,576	5,652
Coastal Dunes and Beaches[5/]	N/A	0	2	0	192	199	393
Roads	N/A	40	44	33	121	792	1,029
Open Water-Lakes, Rivers, and Streams	N/A	21	55	131	470	4,101	4,779
Bays and Estuaries	N/A	0	0	0	0	1,870	1,870
Other Non-Forest Habitat[6/]	N/A	41	234	25	191	459	949
Non-Forest Subtotal		**118**	**397**	**442**	**3,465**	**71,301**	75,724
Total Overall Habitat[7/]	L-O	4,861	4,400	1,092	18,640	6,440	35,434
	M-S	1,970	584	242	7,640	17,152	27,586
	C-R	2,262	5,787	3,716	8,355	60,133	80,252
	No Age	0	0	0	78	2,596	2,675
	Non-Forest	118	397	442	3,465	71,301	75,724
	Total	**9,211**	**11,169**	**5,491**	**38,179**	**157,622**	221,671

1/ Forest-Woodland Age Categories are L-O, Late Succession/Old Growth assumed to be ≥80 years old; M-S, Mid-Seral assumed to be ≥40 but ≤80 years old; C-R, Clearcut-Regenerating Forest assumed to be ≤40 years old; Age classes were determined by using BLM modeling developed for the WOPR (http://www.blm.gov/or/plans/wopr/data/final/data-details.php?id=199).
2/ Other Federal Lands include Bureau of Reclamation, U.S. Fish and Wildlife Service Lands, GSA Lands, BLM Lands, and other NFS lands not crossed by the proposed Project
3/ Other Forest-Woodland Habitat: delineation and available GIS data sources indicate that the area is forested but Johnson & O'Neil, 2001 GIS database identified the area as non-forested. Forested habitats that were not included in the Habitat Categories above were also included in this category.
4/ Grasslands were only delineated within a variable approximately 2000 foot Project corridor; outside this corridor, grasslands are included in the Agriculture and Pastures category.
5/ Coastal Dunes and Beaches are Categorized within the Siuslaw NF (Oregon Dunes National Recreation Area).
6/ Other Non-Forest Habitat: delineation and available GIS data sources indicate that the area is not forested but Johnson & O'Neil, 2001 GIS database identified the area as forested.
7/ Forested wetlands are included in this overall total by seral stage, and not in the overall non-forest total presented here.

The analysis area for fish (Section 6.2.5) consists of waterbody crossings as described in Appendix C. Most of these waterbodies would be crossed using a dry open cut method, meaning they would be dewatered prior to surface disturbance.

In order to assess the cumulative effects of the Project on a broad scale, impacts from the Project combined with impacts from reasonably foreseeable Projects were assessed by fifth field watershed. Thus, the cumulative effects analysis area for each species consists of the fifth field watershed(s) where the Project crosses national forests where the species has been documented or is suspected to occur. For example, the pallid bat has been documented on all three national forests crossed by the Project, so the pallid bat cumulative effects analysis area consists of all seven fifth field watersheds crossed by the Project.

6.1.2 Impacts

6.1.2.1 *Duration of Impact*

Construction activities for the proposed pipeline would be initiated by Pacific Connector approximately 1 year after work begins on the LNG terminal in five construction spreads along the proposed 232-mile pipeline. The five construction spreads would include all timber clearing, construction, and restoration activities within a specific MP range along the pipeline. The location of each construction spread is provided in Table 4.

Table 4. Pacific Connector Pipeline Construction Spread Locations

Spread	MP Range[1/]	Length (miles)
Haynes Inlet	1.2R-4.2R	2.74
1	4.2R to 51.6	52.35
2	51.6 to 94.67	44.67
3	94.67 to 132.47	37.49
4	132.47 to 169.5	37.01
5	169.5 to 228.13	57.61
	Total	231.88

1/ MPs remain the same (through the use of equations), although reroutes have been incorporated into the alignment and the actual spread lengths have been adjusted.

General timing of activities for each of the five construction spreads is discussed in more detail in Section 2.0 of the FEIS and is shown schematically in Figure 2, below. Table 5, below, includes additional seasonal timing restrictions associated with bird species that are not reflected in Figure 2. Pacific Connector anticipates that timber clearing would generally occur from mid-July through November in order to avoid timber felling within the core migratory bird breeding period (April 1-July 15). The pipeline construction would occur from early May through November. Exceptions to this timeline would occur where adherence to seasonal restrictions for federally endangered or threatened species is expected and in Spread 5 (MP 170 – 228) where

winter construction is scheduled in part to comply with Oregon Department of Fish and Wildlife (ODFW) instream construction windows (Figure 2). Construction activities would be conducted during daylight hours only. The average time a given point along the pipeline is estimated to be disturbed by construction would be approximately 8 weeks. This would vary, as the speed at which crews would be able to work would be affected by terrain, construction methods and activities, weather, and environmental construction windows.

During operation of the proposed pipeline, Pacific Connector would maintain a 30-foot wide ROW corridor, centered over the pipe, for the length of the pipeline. ROW maintenance activities (i.e., mowing, cutting) would occur every 3 to 5 years and would have the potential to impact species associated with habitats within that corridor. To avoid disturbance and destruction of bird eggs and nests, all vegetation maintenance would be conducted in late summer or early autumn, after nesting has generally been completed.

Biological Assessment Project Year		BA Year 2						BA Year 3									BA Year 4																				
Pipeline Construction Year					PCGP Year One (Project Year Two)												PCGP Year Two (Project Year Three)																		PCGP Year Three		
Quarters		3			4			1			2			3			4			1			2			3			4								
Month (Wet Season)		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D					
Project Component	**Miles**																																			
Spread One (MPs 1.47R - 49.73; 53.00 miles) [1]																																				
Construction - Coos Bay [2]	**3**							MPs 1.7 - 4.1																														
Complete Coos River HDD [3, 7, 9]	**0.18**														MPs 11R-11.3R [3]																						
Timber – ESA [5, 5a]	**11.7**																																			
Construct – ESA [5, 5a]/Non-ESA; Restoration [10]	**11.7**																																			
Timber – Non ESA	**30.3**																																			
Spread Two (MPs 49.73 - 94.67; 42.44 miles) [1]																																				
Timber – ESA [4, 5, 5a]	**7**																																			
Timber – NonESA	**38**																																			
Construct – ESA/NonESA [5,5a];Restoration [10]	**45**																																			
Complete S. Umpqua River Direct Pipe [8, 9]	**0.58**														MPs 71.1 - 71.4 [8,9]																						
Spread Three (MPs 94.67 – 132.10; 41.24 miles) [1]																																				
Timber – ESA [4, 5a]	**10**																																			
Timber – NonESA [6]	**27**																																			
Construct – ESA/NonESA [5a, 6]; Restoration [10]	**37.5**																																			
Complete Rogue River HDD [5, 8, 9]	**0.58**														MPs 122.4 to 122.8 [8]																						
Spread Four (MPs 132.10 - 188; 50.75 miles) [1]																																				
Timber – ESA [4, 5a]	**8.5**																																			
Timber – NonESA [4, 6]	**47**																																			
Construct –ESA/NonESA [4, 5a, 6]; Restoration [10]	**55.3**																																			
Spread Five (MPs 188 - 228.13; 44.59 miles) [1]																																				
Timber Removal	**11.6**																																			
Construct [6]	**40.3**																																			
Complete Klamath River HDD [7, 9]	**0.43**														MPs 199.2 - 199.7 [7,8]																						
Aboveground Facilities																																				
Meter Stations; Restoration [10]																																				
Compressor Station; Restoration [10]																																				

[1] Because of the various reroutes incorporated into the Proposed Project alignment and the incorporation of engineering station equations, milepost ranges cannot be subtracted to calculate the spread length.

[2] Construction within ODFW-recommended in-water work window (October 1 through February 15).

[3] ODFW-recommended in-water work window is from October 1 through February 15. Because of the extensive wetland location on the south side of the Coos River, Pacific Connector has scheduled the HDD during the dry season outside the in-water work window between August 1 and September 30 to minimize surface impacts within the saturated floodplain wetland.

[4] This segment of pipeline may require helicopter use for timber removal and pipeline construction.

[5] Timber clearing is scheduled to be completed between 9/16 and 3/31 within 300 feet of marbled murrelet (MAMU) stands; construction within 0.25 mile of MAMU stands is scheduled to adhere to daily timing restrictions (DTRs) from April 1 through August 5.

[5a] Timber clearing is scheduled to be completed between 10/1 and 2/28 within 0.25 mile of northern spotted owl (NSO) nests; construction within 0.25 mile of NSO nests is scheduled not to occur between March 1 and July 15.

[6] Within designated big game range, timber removal and construction is scheduled to be conducted between May 1 through November 15.

[7] ODFW-recommended in-water construction window is July 1 through January 31; construction would precede the window by 1 to 2 weeks based on ODFW input.

[8] Construction is aligned, to the extent feasible based on drilling requirements and interagency discussions, with the ODFW-recommended fish windows, which are July 1 through August 31 for the South Umpqua River and June 15 through August 31 for the Rogue River.

[9] For all HDDs and Direct Pipe, upland rig-up and preparation can occur outside the fish window (dark shaded area). Actual drilling under waterbody is denoted by lighter shading. Frac-out risk is highest during initial drilling period; the risk becomes lower as drilling operations proceed and is lowest during pipe pullback. The schedules presented anticipate a reasonable drilling schedule (shown in lighter gray) without major delays due to potential issues such as stuck drill or reaming tools or pipe installation problems. If such issues create delay, the HDD duration, actual drilling, and pipe installation, as denoted by the lighter gray duration periods in the schedule, could extend into the darker gray durations at the end of the HDD/DP or beyond.

[10] Restoration is expected to begin in the fall of Year Two and be completed by the end of the winter season the following year when the forest, wetland, and riparian plantings would be completed.

Figure 2: General Construction Schedule for the Pacific Connector Pipeline

Table 5. Project Seasonal Timing Restrictions Associated with Bird Species for Timber Felling, Logging, Clearing, and Construction Activities

Activity	Migratory Birds	Northern Spotted Owl	Marbled Murrelet	Great Grey Owl	Bald Eagle	Peregrine Falcon
Felling & Brushing[1/]	NO WORK - April 1 - July 15	NO WORK - March 1 - Sept 30	NO WORK - April 1 - Sept 15, 300-ft buffer from stand	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Logging, Skidding & Processing	NO RESTRICTION - If trees and brush[1/] previously removed	NO WORK - March 1 - July 15	DTR[2/] - April 1 - Aug 5, 1/4-mi buffer from stand; April 1 - Sept 15 for Helo	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Clearing, Grubbing, & Stump Removal	NO RESTRICTION - If trees and brush[1/] previously removed	NO WORK - March 1 - July 15	DTR[2/] - April 1 - Aug 5, 1/4-mi buffer from stand	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Driving Through Restricted Area on ROW	NO RESTRICTION - If trees and brush[1/] are not impacted or have been previously removed	NO RESTRICTION - If trees previously removed	DTR[2/] - April 1 - Aug 5, 1/4-mi buffer from stand if trees have been previously removed	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION
Driving Through Restricted Area on Existing Access Road	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION	NO RESTRICTION
Pipeline Construction	NO RESTRICTION - If trees and brush[1/] previously removed	NO WORK - March 1 - July 15	DTR[2/] - April 1 - Aug 5, 1/4-mi buffer from stand; April 1 - Sept 15 for Helo	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Maintenance on Existing Access Roads	NO RESTRICTION - If trees and brush[1/] previously removed	NO WORK - March 1 - July 15	DTR[2/] - April 1 - Aug 5, 1/4-mi buffer from stand	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
Access Road Improvement & New Road Construction	NO WORK - April 1 - July 15 If cutting trees or brush[1/]	NO WORK - March 1 - Sept 30 If cutting trees NO WORK - March 1 - July 15 If no tree removal	NO WORK - April 1 - Sept 15, 300-ft buffer from stand if cutting trees; DTR[2/] - April 1 - Aug 5, 1/4-mi buffer from stand if no tree removal	NO WORK - March 1 - July 31	NO WORK - Jan 1 - Aug 31	NO WORK - Jan 1 - July 31
AFFECTED SPREADS	ALL	ALL in defined locations	1 & 2 in defined locations	2 & 4 in defined locations	1 in defined location	3 in defined location

1/ All forest reprod areas (not including recent clear-cuts), deciduous tree groves, shrub/brush thickets, etc. are considered migratory bird habitat and will need to be removed outside the nesting window, just like merchantable timber. Crushed understory in felled timbered areas will not be considered migratory bird habitat and does not have to be cut to meet Migratory Bird Treaty Act requirements.
2/ DTR - Daily Timing Restrictions stipulate no work until two hours after sunrise and work must stop two hours before sunset.

1

6.1.2.2 *Habitat Effects*

Impact to habitats can result in direct effects to organisms (e.g., mortality, displacement, increased energy expense, decreased reproduction) if they inhabit the affected areas while construction or other human-related disturbances occur.

Indirect impacts are related to but removed from the action by an intermediate step or process. For wildlife, indirect impacts are often associated with alteration, elimination, or degradation of habitats. As habitat becomes less suitable and less available, wildlife populations that may have been in equilibrium with the amount of formerly suitable habitat must adjust, through density-dependent mechanisms, to reach new equilibria with habitats (often called carrying capacity). Impacts to wildlife, whether direct or indirect, affect demographic parameters by decreasing survival and/or decreasing reproduction. Such impacts can lead to decreasing population growth rates and smaller populations.

Indirect effects may result from induced changes to wildlife habitats, potentially by conversion of one vegetation cover type to another, by fragmenting existing wildlife habitats and inducing various “edge effects” to interior habitats, and in general by affecting a variety of inter- and intra-specific interactions including competition and predation. Such indirect impact to habitats decreases their functional capacity to support wildlife populations at non-impacted levels. Indirect effects and/or secondary effects of the Project on wildlife may also occur with increased human population base and increased access, whether as a result of the requirements of the action itself (the workforce needed to construct or operate the Project) or as a consequence of the action such as increasing a need for ancillary goods, services, or opportunities resulting from the Project (Comer 1982).

Seventeen broad wildlife habitat classifications coincide with the Project area (Johnson and O’Neil 2001). Affected wildlife habitats classified by Johnson and O’Neil (2001) include: 1) Westside Lowland Conifer-Hardwood-Forest, 2) Montane Mixed Conifer Forest, 3) Southwest Oregon Mixed Conifer-Hardwood Forest, 4) Ponderosa Pine Forest and Woodlands, 5) Westside Oak and Dry Douglas-fir Forest and Woodlands, 6) Western Juniper/Mountain Mahogany Woodlands 7) Sagebrush Steppe, 8) Westside Grasslands, 9) Eastside Grasslands, 10) Herbaceous Wetlands, 11) Westside Riparian-Wetlands, 12) Eastside Riparian-Wetlands, 13) Agriculture, Pastures, and Mixed Environs, 14) Developed-Urban and Mixed Environs, 15) Coastal Dunes and Beaches 16) Open Water-Lakes, River, and Streams, and 17) Oceans, Bays and Estuaries (see Table 6).

Roads have been added to the habitats in Table 6. In addition, relative seral development, described as Late Successional-Old Growth (LO), Mid-Seral (MS), and Clearcut-Regenerating (CR) forested types, have been identified for the several forest and woodland types in the Table. Specialized habitat features also occur within the vicinity of the Project area. Such features include cliffs that provide nesting for peregrine falcons and possibly other raptors. Snags provide roosting locations for several bat species and nesting locations for several raptor species and cavity-nesting birds. Large downed woody debris is present with which

herpetofauna are often associated, and caves that are used as hibernacula by some bat species.

For other species, use of a specific habitat type included in Table 6 depends on its proximity to water (Johnson and O'Neil 2001). Presence of those habitats and dependent species' potential occurrence has been assumed if habitats occur within Riparian Reserves associated with waterbodies that would be crossed by or are adjacent to the proposed action (Table 7, Table 8).

The acres of each habitat type that would be either removed by construction or modified by use as Uncleared Storage Areas (UCSAs) provide the basis for evaluating effects to the sensitive species included in this BE. Detailed effects to habitats by various Project construction and operational components are provided in Appendix B for each National Forest.

Table 6. Effects to acres of Johnson and O'Neil Habitat Type by National Forest										
General Habitat Type	Johnson and O'Neil (2001) Habitat Types	Seral Stage[1/]	National Forest						National Forest Total (acres)	
			Umpqua		Rogue River		Winema			
			Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]
Forest-Woodland	Westside-Lowland Conifer-Hardwood-Forest	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Montane Mixed Conifer Forest	LO	0.00	0.00	12.65	4.07	6.30	2.95	18.95	7.02
		MS	0.00	0.00	6.88	3.57	2.72	0.92	9.60	4.49
		CR	0.00	0.00	33.92	11.65	18.16	3.23	52.08	14.87
		Total	**0.00**	**0.00**	**53.46**	**19.29**	**27.17**	**7.10**	**80.63**	**26.39**
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO	88.78	32.59	64.95	31.33	33.03	2.56	186.76	66.49
		MS	33.40	7.62	5.81	1.65	6.75	0.73	45.96	10.00
		CR	21.16	1.49	49.03	14.10	9.29	1.10	79.48	16.69
		Total	**143.33**	**41.70**	**119.80**	**47.08**	**49.08**	**4.39**	**312.20**	**93.17**
	Ponderosa Pine Forest and Woodlands	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Western Juniper and Mountain Mahogany Woodlands	LO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6. Effects to acres of Johnson and O'Neil Habitat Type by National Forest										
General Habitat Type	Johnson and O'Neil (2001) Habitat Types	Seral Stage[1/]	National Forest						National Forest Total (acres)	
			Umpqua		Rogue River		Winema			
			Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]
		Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Forest-Woodland (cont.)	Forest-Woodland Sub-Total	LO	88.78	32.59	77.60	35.40	39.33	5.51	205.71	73.51
		MS	33.40	7.62	12.69	5.23	9.47	1.65	55.56	14.49
		CR	21.16	1.49	82.96	25.74	27.46	4.33	131.57	31.56
		Total	**143.33**	**41.70**	**173.25**	**66.37**	**76.26**	**11.49**	**392.84**	**119.56**
Grasslands-Shrublands	Shrub-Steppe	N/A	0.00	0.00	6.75	0.62	0.00	0.00	6.75	0.62
	Westside Grasslands	N/A	0.00	0.00	2.53	0.32	0.00	0.00	2.53	0.32
	Eastside Grasslands	N/A	0.00	0.00	0.38	0.00	0.91	0.00	1.29	0.00
Wetland/Riparian	Herbaceous Wetlands	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Westside Riparian Wetlands	N/A	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.00
	Eastside Riparian Wetlands	N/A	0.00	0.00	0.00	0.00	0.28	0.00	0.28	0.00
Developed	Agriculture, Pastures and Mixed Environs	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Developed-Urban and Mixed Environs	N/A	12.05	0.00	15.67	0.00	0.00	0.00	27.72	0.00
Barren	Roads	N/A	13.21	0.42	12.58	2.45	3.18	0.06	28.97	2.93
	Beaches	N/A	0.00	0.00	1.54	0.00	0.00	0.00	1.54	0.00
Open Water	Open Water-Lakes, Rivers, and Streams	N/A	0.37	0.00	0.13	0.09	0.03	0.00	0.53	0.09
	Bays and Estuaries	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6. Effects to acres of Johnson and O'Neil Habitat Type by National Forest

General Habitat Type	Johnson and O'Neil (2001) Habitat Types	Seral Stage[1/]	National Forest						National Forest Total (acres)	
			Umpqua		Rogue River		Winema			
			Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]	Acres Removed[2/]	Acres Modified[3/]
Other Non-Forest Habitat[4/]			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total			**169.04**	**42.12**	**212.84**	**69.85**	**80.65**	**11.55**	**462.53**	**123.53**

1/ Forest-Woodland Age Categories Acres are LO, Late Successional/Old Growth assumed to be ≥80 years old; MS, Mid-Seral assumed to be ≥40 but ≤80 years old; CR, Clearcut-Regenerating Forest assumed to be ≤40 years old.

2/ Project components considered in calculation of habitat "Removed": Project construction ROW, temporary extra work areas, aboveground facilities, permanent and temporary access roads (PAR, TAR), pipe storage yards, rock source/disposal sites, and hydrostatic discharge sites.

3/ Project components considered in calculation of habitat "Modified": Project UCSAs that would not be cleared of trees during construction. These areas would be used to store forest slash, stumps and dead and downed log materials that would be removed and scattered across the ROW after construction during restoration and are considered as temporary insignificant habitat modifications.

4/ Other Non-Forest Habitat: delineation and available GIS data sources indicate that the area is not forested and includes, for example, roads, quarries, lake shorelines, and other non-forested habitats.

Table 7. Total Terrestrial Habitat Affected/Removed[1/] by Construction within Riparian Reserves in Fifth Field Watersheds

Fifth Field Watershed (Hydrologic Unit Code) and Landowner	Forested Habitat (acres)					Other Habitat (acres)						
	Late Successional - Old Growth	Mid-Seral	Regenerating	Clearcut	Total	Forested Wetland	Non-Forested Wetland	Unaltered Non-Forested Habitat	Agriculture / Pasture	Altered Habitat	Total	Total Riparian Reserves Impact (acres)
Upper Cow Creek (HUC 1710030206)												
Umpqua National Forest	2.83	2.80	3.92	0.00	**9.56**		0.06			0.75	**0.81**	**10.37**
Trail Creek (HUC 1710030706)												
Umpqua National Forest		1.47			**1.47**					2.45	**2.45**	**3.92**
Little Butte Creek (HUC 17100300708)												
Rogue River National Forest	1.34	0.12	1.76		**3.22**			0.19			**0.19**	**3.41**
Spencer Creek (HUC 1801020601)												
Winema National Forest	1.59	0.34	1.84		**3.76**	0.28		0.04		0.13	**0.45**	**4.21**
All Fifth Field Watersheds												
Umpqua National Forest	2.83	4.27	3.92	0.00	**11.03**	0.00	0.06	0.00	0.00	3.19	**3.26**	**14.29**
Rogue River National Forest	1.34	0.12	1.76	0.00	**3.22**	0.00	0.00	0.19	0.00	0.00	**0.19**	**3.41**
Winema National Forest	1.59	0.34	1.84	0.00	**3.76**	0.28	0.00	0.04	0.00	0.13	**0.45**	**4.21**
Fifth Field Watershed Total	**5.76**	**4.73**	**7.52**	**0.00**	**18.01**	**0.28**	**0.06**	**0.23**	**0.00**	**3.32**	**3.90**	**21.91**

1 / Project components considered in calculation of habitat "Removed": Project construction ROW, temporary extra work areas, aboveground facilities, and permanent and temporary access roads (PAR, TAR). Habitat "Modified," i.e., UCSAs, are not considered here because there are no UCSAs in Riparian Reserves so habitat removed is the extent of habitat affected.

2/ Habitat Types within Late Successional Reserves generally categorized as: Late Successional (Mature) or Old Growth Forest (coniferous, deciduous, mixed ≥80 years old); Mid-Seral Forests (coniferous, deciduous, mixed ≥ 40 but ≤ 80 years old); Regenerating Forest (coniferous, deciduous, mixed ≥5 but ≤40 years old); Clearcut Forests; Wetland Forested, Unaltered Nonforested Habitat (grasslands, sagebrush, shrublands), and Altered Habitats (urban, industrial, residential, roads, utility corridors, quarries).

Table 8. Total Terrestrial Habitat Affected in the 30-foot-wide Maintained Corridor within Riparian Reserves in Fifth Field Watersheds

Fifth Field Watershed (Hydrologic Unit Code) and Landowner	Forested Habitat (acres)[1/]				Other Habitat (acres)[1/]					Total Riparian Reserves Impact (acres)
	Late Successional-Old Growth	Mid-Seral Forest	Regenerating Forest	Total	Forested Wetland	Non-Forested Wetland	Unaltered Non-Forested Habitat	Altered Habitat	Total	
Upper Cow Creek (HUC 1710030206)										
Umpqua National Forest	0.78	0.69	1.08	**2.56**	0.01	0.00	0.00	0.19	**0.20**	**2.76**
Little Butte Creek (HUC 1710030708)										
Rogue River National Forest	0.3	0.04	0.47	**0.80**	0.00	0.00	0.06	0.00	**0.06**	**0.87**
Spencer Creek (HUC 1801020601)										
Winema National Forest	0.65	0.09	0.47	**1.21**	0.10	0.00	0.00	0.02	**0.12**	**1.33**
All Fifth Field Watersheds										
Fifth Field Watershed Total	**1.73**	**0.82**	**2.01**	**4.57**	**0.11**	**0.00**	**0.06**	**0.21**	**0.39**	**4.96**

1/ Habitat Types within Late Successional Reserves generally categorized as: Late Successional (Mature) or Old Growth Forest (coniferous, deciduous, mixed ≥80 years old); Mid-Seral Forests (coniferous, deciduous, mixed ≥40 but ≤80 years old); Regenerating Forest (coniferous, deciduous, mixed ≥5 but ≤40 years old); Clearcut Forests; Wetland Forested, Unaltered Nonforested Habitat (grasslands, sagebrush, shrublands), and Altered Habitats (urban, industrial, residential, roads, utility corridors, quarries).

Pacific Connector prepared estimates of snag density (numbers of snags per acre) that would be affected within the construction ROW and Temporary Extra Work Areas (TEWAs) on each of the three national forests based upon timber reconnaissance conducted in 2007 (Chapman 2007). Snag density by size category (inches, diameter at breast height [dbh]) and decay class (hard or soft) are provided in Table 9. Most of the smaller snags (<13 inches, dbh) were observed as hard wood, rather than softened due to decay. The number of snags removed by the Project within each National Forest was calculated by multiplying the sum of hard and soft decay-class densities for all size categories by the acreage of forest-woodland removed during construction (Table 6). Loss of snags regardless of decay class is expected to be a long-term impact because recruitment of new snags within the affected areas would take much longer than 3 years. Estimates of snags within removed acres, as well as within the 700-foot and 3,200-foot analysis areas can be found in Appendix D; these estimates were generated by extrapolating estimates of snag density per acre (Table 9) by acres of forested habitat.

Table 9. Snag Density Estimates on Forest Service Lands

National Forest	Tree Type	Decay Class	Estimates of Snag Density (Number per Acre) by Size Category (inches, dbh)			
			<13	13-24	25-36	>36
Umpqua	conifer	Hard	5.0	0.6	0.8	0.0
		Soft	0.1	0.4	0.2	0.4
Rogue River	conifer	Hard	1.0	0.2	0.1	0.01
		Soft	0.0	0.5	0.2	0.0
	hardwood	Hard	1.5	0.0	0.0	0.0
		Soft	0.0	0.1	0.0	0.0
Winema	conifer	Hard	3.0	0.1	0.1	0.0
		Soft	0.0	0.4	0.1	0.0

6.1.2.3 *Invasive Species*

Invasive species are of concern for all terrestrial and aquatic species. Short- or long-term impacts to fish and wildlife habitat could result if the proposed pipeline causes the establishment and spread of noxious weeds, as well as other invasive species (animals and microbes) not native to a region. Noxious weeds often out-compete native vegetation. They displace native species by spreading rapidly and utilizing resources (nutrients, water, sunlight) that can eventually lead to a weed-dominated monoculture.

Clearing of vegetation from the ROW and soil disturbance from ROW grading could increase the chance of spreading noxious weeds through the removal of native, established species and soil disturbance, which could encourage the establishment of invasive plants. Equipment moving along the ROW could also bring seeds from one place to the next, aiding the spread of these species. Pacific Connector developed an Integrated Pest Management Plan, in consultation with the Oregon Department of Agriculture (Butler 2006), BLM, and the Forest Service, to minimize the potential spread and infestation of weeds along the construction ROW.

This plan can be found in Attachment 14 to the Plan of Development, which was included in Pacific Connector's application to the FERC. This plan includes surveys prior to construction to determine the presence of noxious weeds; cleaning of construction equipment in areas where weeds have been identified or when leaving these areas to prevent the import and spread of weeds; and vegetation clearing and grading requirements in areas of noxious weeds. Additionally, disturbed areas would be replanted with appropriate seed mixes to prevent noxious weed germination. After construction, the ROW would be monitored and any noxious weed infestations would be controlled. Pacific Connector would also investigate noxious weed issues raised by landowners during operation of the pipeline.

6.1.2.4 *Noise Disturbance*

Noise could potentially impact wildlife during clearing and grading of the construction ROW, during pipeline construction, and during ROW clean up, restoration, maintenance, and travel to and from the site. In some remote and steep areas crossed by the proposed pipeline, helicopters may be used during ROW timber-clearing and during pipe delivery and pipeline surveys. Minimal increase in ambient noise levels would also occur during periodic ROW vegetation maintenance activities (i.e., mowing, chainsaws) during operation. Noise would most likely temporarily displace wildlife some distance away from noise sources if wildlife species are nearby. However, any short-term effects to wildlife by noise would occur simultaneously with human presence and the presence of heavy machinery normally required for pipeline construction. Most likely, any impacts to wildlife due to noise could not be separated from those due to all other construction-related activities occurring concurrently. Noise and human presence would move along the construction ROW, albeit at a rather slow pace. Therefore, impacts to wildlife because of noise would be of relatively short duration (approximately 8 weeks in a given area) and spatially localized (by construction spread as described in Section 6.1.2.1).

Research has demonstrated varying short-term reactions of wildlife to noise. Most research has focused on wildlife reaction to more constant noise generated by roads and high-volume traffic (e.g., Forman and Alexander 1998). However, some research has documented wildlife reaction to airplanes, sonic booms, helicopters, artillery, and blasting that could produce similar reactions from noises associated with construction activities for the proposed Project. Golden et al. (1980) provided the following behavioral and physiological reactions of animals to known noise levels ranging between 75 and 105 dB from various disturbances, including aircraft:

- Fish demonstrate reduced viability, survival, and/or growth (20 dB for 11 to 12 days);
- Ungulates become nervous and/or run (82 to 95 dB) or panic (95 to 105 dB);
- Waterfowl flock (80 to 85 dB), move and/or become nervous (85 to 95 dB), or startle (95 to 105 dB); and
- Other birds scare (85 dB).

Raptors and other forest-dwelling bird species have demonstrated more adverse impacts to project-generated sound during nesting and breeding when levels substantially exceed ambient conditions existing prior to a project (i.e., by 20 to 25 dB experienced by the animal) and when the total sound level is very high and exceeds 90 dB. Such impact could potentially result in egg

failure or reduced juvenile survival, malnutrition or starvation of the young, or reducing the growth or likelihood of survival of young. In contrast, these effects may be minimal; Awbrey and Bowles (1990) found that raptors that flushed from their nests while incubating did not leave the eggs exposed for more than 10 minutes, and concluded that multiple, closely spaced disturbances would be required to cause lethal egg exposure. Some raptors, for example osprey, refuse to be flushed from their nest despite closely approaching helicopters (Poole 1989).

Pacific Connector anticipates ambient sound levels in much of the proposed pipeline area would be similar to the Arcata Fish and Wildlife Office's projections (FWS 2006). Ambient sound is defined as the sound qualities as they might exist currently and might include human-generated sources over the long term. The typical ambient sound level for forest habitats ranges from 25 dBA to 44 dBA (FWS 2006).

Noise levels at stream crossings are expected to be within the range of normal construction activity. Pacific Connector anticipates 14 stream crossings along 4 creeks on NFS lands (Appendix C). Pacific Connector proposes to use dry open-cut methods to cross the creeks and not horizontal directional drilling (HDD) which typically results in higher noise levels. Dry open-cut methods use a pump and flume procedure to route the water around the pipeline trench area.

Double rotor helicopters may be used during timber clearing and pipeline construction along portions of the proposed Pacific Connector pipeline in areas that would be less accessible to pipeline construction contractors and logging trucks. Noise associated with this size of helicopter (generally >92 dBA) could have negative impacts to species, especially bird species during the breeding season. However, this level of noise attenuates to 92 dBA at distances of 650-700 feet from the aircraft. Conservation measures to reduce noise from helicopters consist of maintaining flight speed of 80 to 90 knots (92 to 104 miles per hour), gradual and controlled movement, and avoidance of noise sensitive areas (Appendix O of the BA).

Pacific Connector indicated that it may use helicopters for timber clearing and pipe stringing within locations where there are steep slopes and limited access to the ROW. All of the locations identified in Table 10 occur on the Umpqua National Forest.

Table 10. Helicopter Staging Locations

Begin MP	End MP	Helicopter Staging
101.3	102.30	TEWA 101.63-N, 101.77-N, & 102.19-N
108.5	110.40	TEWA 109.10-W, & 110.34-W TEWA 110.73 Helicopter landing Peavine Quarry
116.30	117.85	TEWA-116.59-W, & 117.68-N
123.30	125.15	TEWAs 123.53-W, 123.71-N, 124.30-N, 124.54-W, 124.99-W, & 124.95-N

Blasting may be required for pipeline trench construction in areas where hard, non-rippable bedrock occurs within the trench profile; however, alternate mechanical methods would first be

employed in order to attain the desired trench depth, such as ripping, hydraulic hammers or rock saws (Appendix N of the BA). The bedrock units that may require blasting are expected to consist primarily of volcanic and metavolcanic rocks in the Klamath Mountains and volcanic rocks in the Cascade Range and along the ridges in the Basin and Range physiographic province.

Pacific Connector identified areas where blasting may be necessary by reviewing the Natural Resource Conservation Service soils maps and descriptions to identify soil units that typically contain bedrock within 5 feet of the ground surface. Low, moderate, and high potential blasting areas were identified on and adjacent to Forest Service-managed lands. Specifically, there is low potential for blasting between MPs 110.9 and 112.1 within the Umpqua National Forest, moderate to high potential for blasting between MPs 112.1 and 135.4 within the Umpqua National Forest and adjacent private, BLM, and state land, and high potential for blasting between MPs 159.9 and 172.0 within the Rogue River and Winema national forests and adjacent private land. Blasting activities may involve a single blast or a repetitive blasting sequence. As reported by the Arcata Fish and Wildlife Office (FWS 2006), noise associated with blasting activities may be in the range of 112 decibels (dB) within 50 feet of the trench and may cause alarm in wildlife. Blasting during pipeline construction is expected to generate lower dBA levels (~75 -100dB) since all blast charges would be underground and muffled with blasting mats, but could be as high as 112dB (Appendix P of the BA).

Table 11 estimates cumulative noise (dBA) at 50 feet associated with each activity in the proposed Project (Figure 3). Table 11 also estimates noise levels at 200 feet and 1,320 feet with or without a buffer of trees between the noise and the target point. Additionally, the distance at which the noise would attenuate to background (assuming an ambient noise level of 40 dBA) is estimated. Average noise levels over the entire construction sequence would be 84.68 dBA if trenching in rock-free areas, or 85.37 dBA if trenching in rocky areas that may include blasting. If blasting were needed, the maximum attenuation distance to background (40 dBA) would be approximately 2.2 miles if terrain was flat and no trees were present. However, if 100 feet of trees were present, the distance would decrease to approximately 1.4 miles.

Distances at which noise would attenuate to ambient levels would depend on local conditions such as tree cover and density, topography, weather (humidity), and wind, all of which can alter background noise conditions (see Appendix P of the BA). Consequently, short-term impact to wildlife by noise would vary along the length of the proposed pipeline.

Table 11. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence									
Drawing Number [1/]	Pipeline Construction Sequence [1/]	Equipment Expected [2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
1	ROW Acquisition and Survey	Pickup Truck Chain Saw	88	73	68	53	48	4,222	2,660
2	Clearing and Grading	Pickup Truck Chain Saw Excavator Dozer Flatbed Truck Loader Shovel Logger-Cutter Skidder Crawler-Chipper	93	78	73	58	53	6,745	4,249
3	Fencing	Pickup Truck Auger Drill Rig	86	71	66	51	46	3,510	2,211
4	Centerline Survey of Ditch	Pickup Truck	80	63	58	45	40	2,016	1,270

Table 11. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence

Drawing Number [1/]	Pipeline Construction Sequence [1/]	Equipment Expected [2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
5	Ditching (Rock-Free)	Pickup Truck Backhoe Excavator Dozer Flatbed Truck Dump Truck Tracked Ditcher	86	71	66	51	46	3,510	2,211
OR									
6	Ditching (Rock)	Pickup Truck Backhoe Excavator Dozer Flatbed Truck Auger Drill Rig Mounted Impact Hammer Rock Drill Blasting (Mitigated rock fracturing) Dump Truck	99	84	79	64	58	11,670	7,352
7	Padding Ditch Bottom	Pickup Truck Backhoe Excavator Dump Truck	86	71	66	51	46	3,510	2,211
8	Stringing	Pickup Truck Excavator Flatbed Truck Crane	86	71	66	51	46	3,510	2,211

Table 11. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence

Drawing Number [1/]	Pipeline Construction Sequence [1/]	Equipment Expected [2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
9	Bending	Pickup Truck Excavator Dozer	87	72	67	52	47	3,850	2,425
10	Line Up, Stringer Bead and Hot Pass	Pickup Truck Excavator Dozer Side-Boom Welder/Torch	86	71	66	51	46	3,510	2,211
11	Fill and Cap Weld	Pickup Truck Welder/Torch	81	66	61	46	41	2,211	1,393
12	As-Built Footage	Pickup Truck Welder/Torch	82	67	62	47	42	2,425	1,528
13	X-Ray and Weld Repair	Pickup Truck Welder/Torch	82	67	62	47	42	2,425	1,528
14	Coating Field and Factory Welds	Pickup Truck Welder/Torch	82	67	62	47	42	2,425	1,528
15	Inspection (Jeeping) and Repair of Coating	Pickup Truck	80	65	60	45	40	2,016	1,270
16	Lowering In and Tie-Ins	Pickup Truck Backhoe Excavator Dozer	87	72	67	52	47	3,850	2,425
17	As-Built Survey	Pickup Truck	80	65	60	45	40	2,016	1,270
18	Pad and Backfill	Pickup Truck Backhoe Excavator Dozer Dump Truck	87	72	67	52	47	3,850	2,425

Table 11. Estimated Equipment Noise and Noise Attenuation at Specified Distances During a Typical Pipeline Construction Sequence

Drawing Number [1/]	Pipeline Construction Sequence [1/]	Equipment Expected [2/]	Estimated Cumulative Noise (dBA) At 50 feet [3/]	Estimated Noise (dBA) at 200 feet[4/]		Estimated Noise (dBA) at 0.25 miles[4/]		Attenuation Distance (feet) to Background[6/]	
				No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]	No Trees	With Trees (100 ft)[5/]
19	Test and Final Tie-In	Pickup Truck Backhoe Pumps	86	71	66	51	46	3,510	2,221
20	Replace Topsoil and Cleanup	Pickup Truck Backhoe Excavator Dozer Tractor	88	73	68	53	48	4,222	2,660

1/ Drawing Number and Pipeline Construction Sequence are shown in Figure 3.
2/ Equipment expected, based on "typical" pipeline construction requirements at a given location.
3/ Estimated Cumulative Noise at 50 feet is based on equipment-specific noise values (WSDOT 2008; de Hoop and Lalonde 2003) and rules for decibel addition specified by Washington State Department of Transportation (WSDOT 2008).
4/ Noise attenuation assumes "soft site" (absorptive ground) conditions and point-source noise reduction of 7.5 dB for every doubling of distance (WSDOT 2008).
5/ In these estimates, a buffer of 100 feet of dense vegetation is present in line of sight between noise source and receptor. If 200 feet of dense vegetation is present, noise would be reduced by an additional 5 dB.
6/ Background noise assumed to be 40 dB during daylight hours, when construction would occur.
Source: de Hoop and Lalonde 2003; WSDOT 2011.

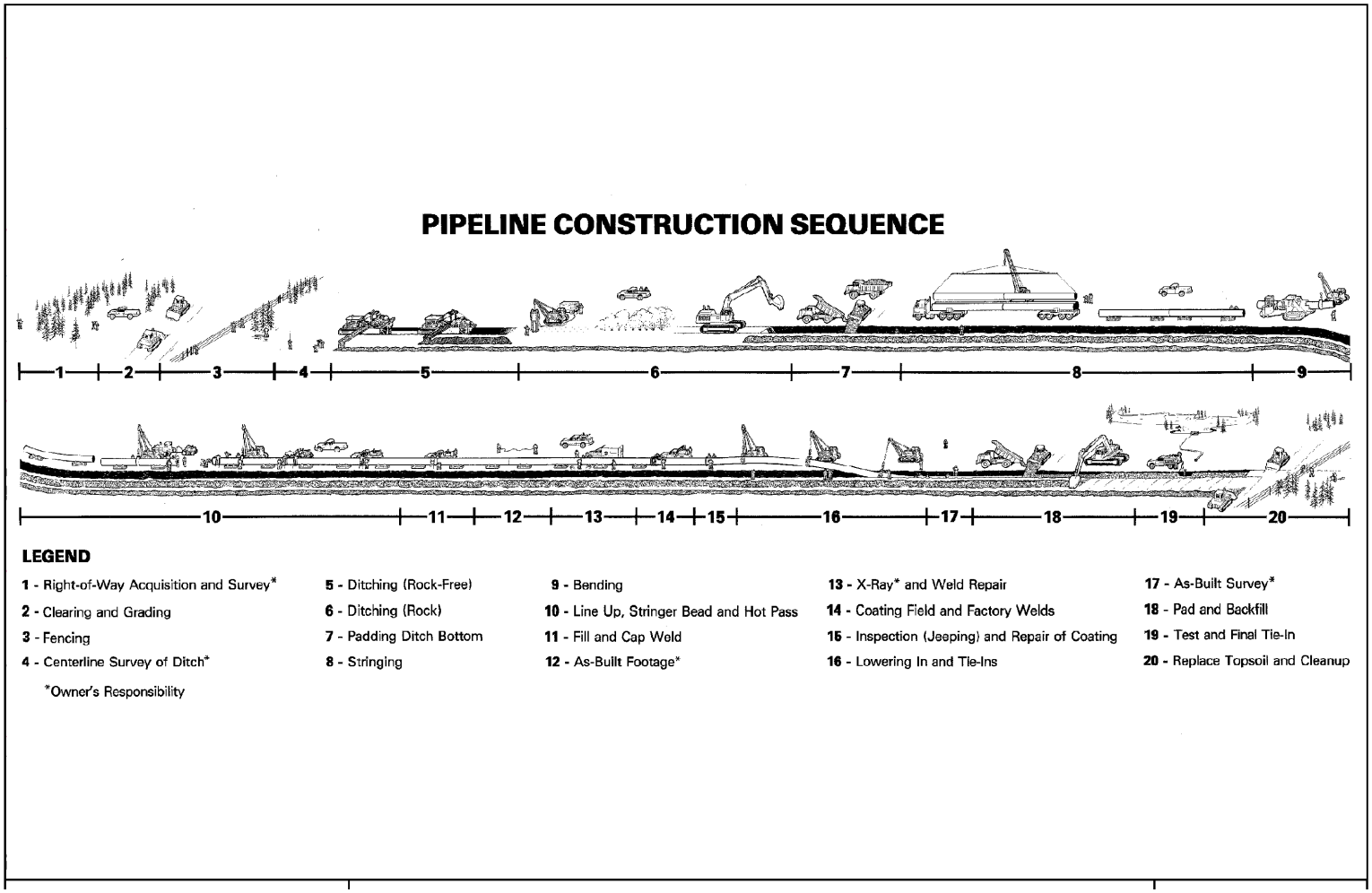

Figure 3: Generalized Pipeline Construction Sequence

6.1.2.5 *Cumulative Impacts*

In order to understand the contribution of past actions to the cumulative effects of the proposed action, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Current and reasonably foreseeable projects that may cumulatively impact resources that would be affected by construction and operation of the proposed Project on Forest Service-managed lands are listed in Table 12. Note that these activities may include projects that are outside Forest Service-managed lands, but within the fifth-field watersheds crossed by the Project on Forest Service-managed lands.

A Forest Service action must meet two criteria to be a candidate for inclusion in the cumulative effects analysis for this BE. The action must:

- Affect a resource (e.g., forests) or resources potentially affected by the proposed Project on Forest Service-managed lands; and
- Overlap with the Project in time and space.

Planned projects within watersheds where the proposed action crosses Forest Service lands include a variety of timber, fuel, grazing and biological projects (Table 12). Planned projects on the Umpqua National Forest include 14 projects within the Elk Creek, Upper Cow Creek and Trail Creek Watersheds (Table 12). Forest Service projects include a weed treatment project, several timber treatments, livestock grazing, a fuelbreak project, and various aquatic restoration projects; other projects include clearcutting on private lands, and a BLM timber sale and three forest management projects (Table 12). On the Rogue River National Forest, there are 12 planned projects within the Little Butte Watershed. Forest Service projects include 8 livestock grazing allotments and one quarry; other projects include three BLM forest management projects (Table 12). On the Winema National Forest, there are 4 planned projects within the Spencer Creek Watershed that consist of a livestock grazing allotment, road maintenance, a noxious weed treatment and a timber harvest project (Table 12).

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Table 12. Current or Proposed Activities Potentially Cumulatively Affecting Resources of Concern on Forest Service-managed Lands

Fifth Field Watershed	Activity	Project Description	Estimated Date
Umpqua National Forest			
Elk Creek	Weed Treatment	50 acres per year. Hand pulling and cutting	Ongoing
	Livestock Grazing	9,963 acres livestock grazing	Unknown
	Proposed Tiller Aquatic Restoration Project	2 culvert replacements, 7 miles instream habitat improvement, 5 sump maintenance sites, 142 acres Riparian Reserve thinning, 1 pond habitat improvement	Expect implementation to begin in 2017
	Anticipated Clear Cutting on Private Land	150 acres	Unknown
	Proposed Elk Creek Collaborative Watershed Restoration Project	200 acres commercial thin, 500 acres fuels reduction, 250 acres prescribed burn, 100 acres pre-commercial thin, 50 acres weed treatment, 50 acres planting, 2 culvert replacements, 5 miles road decommission	Expect implementation to begin in 2015
Upper Cow Creek	Livestock Grazing	8,250 acres	Ongoing
	Anticipated Clear Cutting on Private Land	270 acres	Unknown
	Proposed Tiller Aquatic Restoration Project	1 culvert replacement	Expect implementation to begin in 2017
	Red Mountain Stewardship	1,366 acres shaded fuel break, 240 acres commercial thinning	Expect implementation to begin in 2015
Trail Creek	Livestock Grazing	4,230 acres	Ongoing
	Mouse Trail Timber Sale (BLM lands)	1,000 acres of restoration thinning, 500 acres of pre-commercial thinning	Expected implementation in 2016
	Proposed Trail Creek Forest Management (BLM lands)	714 acres restoration thinning, 75 acres riparian thinning, 1,075 acres hazardous fuels treatment, 282 acres meadow restoration, 50 acres small diameter thinning, 6 pump chances restored, 259 acres roadside firewood cutting, 0.8 miles (2 acres) temporary road construction	Ongoing
	Proposed Trail Creek Forest Management (BLM lands)	336 acres restoration thinning, 13 acres riparian thinning, 414 acres hazardous fuels treatment, 263 acres precommercial thinning, 8 pump chances restored, block 4 roads, replace 1 culvert, decommission 0.5 miles (1 acre) of road, stream restoration on 0.5 miles	Ongoing
	Proposed Trail Creek Forest Management (BLM lands)	20 acres restoration thinning, 1,044 acres hazardous fuels treatment, 2 pump chances restored	Ongoing
Rogue River National Forest			
Little Butte Creek	2004 Deadwood Complex EA (Allotment Management Plan Update for Five Allotments)	400 acres of livestock grazing on the South Butte Allotment	Unknown
	2009 Fish Lake and Rancheria Allotment Management Plan Update	1,000 acres of livestock grazing on the Fish Lake Allotment	Unknown
	2004 Deadwood Complex EA (Allotment Management Plan Update for Five Allotments)	2,000 acres of livestock grazing (900 acres on the South Butte Allotment, and 1,100 acres on the Conde Allotment)	Unknown
	2004 Deadwood Complex EA (Allotment Management Plan Update for Five Allotments)	5,300 acres of livestock grazing on the South Butte Allotment	Unknown
	2009 Fish Lake and Rancheria Allotment Management Plan Update	6,500 acres of livestock grazing on the Fish Lake Allotment	Unknown
	2013 Big Elk Cinder Pit CE (DM will be published within next 6 months)	Excavation of cinders from 5 acres of land in an existing cinder quarry	Unknown

Table 12. Current or Proposed Activities Potentially Cumulatively Affecting Resources of Concern on Forest Service-managed Lands			
Fifth Field Watershed	**Activity**	**Project Description**	**Estimated Date**
Little Butte Creek cont.	2004 Deadwood Complex EA (Allotment Management Plan Update for Five Allotments)	14,100 acres of livestock grazing (7,000 acres on the South Butte Allotment, 4,900 acres on the Deadwood Allotment, and 2,200 acres on the Conde Allotment)	Unknown
	2004 Deadwood Complex EA (Allotment Management Plan Update for Five Allotments)	8,700 acres of livestock grazing on the South Butte Allotment	Unknown
	2004 Deadwood Complex EA (Allotment Management Plan Update for Five Allotments)	16,800 acres of livestock grazing (3,400 acres on the South Butte Allotment, 13,400 acres on the Deadwood Allotment	Unknown
	Salty Gardner DNA (BLM lands)	540 acres hazardous fuels treatment	Ongoing
	Bieber Salt Forest Management, Salty Gardner DNA (BLM lands)	756 acres upland vegetation treatment, 721 hazardous fuels treatment	2017
	Bieber Salt Forest Management, Salty Gardner DNA (BLM lands)	763 acres upland vegetation treatment, 932 hazardous fuels treatment	2017
Winema National Forest			
Spencer Creek	Lakewoods WUI Harvest Project	Variety of fuels treatments surrounding the Lakewoods private land subdivision. Commercial harvest approximately 70 acres	Unknown
	Road Maintenance	Variety of routine road maintenance activities	Unknown
	Buck Indian Allotment	20,000 acres of grazing	Ongoing annually
	Dead Indian Memorial and Clover Creek Highways Noxious Weed Treatment	7 miles of weed treatment	Ongoing annually

1

The cumulative effects analysis for each species takes into consideration the effects of the proposed Project, including proposed mitigation, in conjunction with the reasonably foreseeable projects described above. Table 13 below lists the acreage impacted by the Project, proposed mitigation, and other identified projects by watershed.

Table 13: Cumulative Acres Impacted by Watershed by the Project, Related Mitigation Projects, and Other Projects [1/]

Activity, Fifth Field Watershed	Acres[2/]	Percent of Watershed[2/]
UMPQUA NATIONAL FOREST		
Watershed: Days Creek South Umpqua	76,250	
Other Identified Projects	0	0
Pacific Connector Pipeline and Associated Facilities	842	1.1
Project-related Mitigation on Federal Lands	1,000	1.3
Cumulative Area Impacted	***1,842***	***2.4***
Watershed: Elk Creek South Umpqua	54,895	
Other Identified Projects	1,313	2.4
Pacific Connector Pipeline and Associated Facilities	42	<0.1
Project-related Mitigation on Federal Lands	2,370	4.3
Cumulative Area Impacted	***3,725***	***6.7***
Watershed: Upper Cow Creek	47,416	
Other Identified Projects	1,867	3.9
Pacific Connector Pipeline and Associated Facilities	95	0.2
Project-related Mitigation on Federal Lands	2,004	4.2
Cumulative Area Impacted	***3,975***	***8.3***
Watershed: Trail Creek	28,867	
Other Identified Projects	6,055	21.0
Pacific Connector Pipeline and Associated Facilities	240	0.8
Project-related Mitigation on Federal Lands	1,260	4.4
Cumulative Area Impacted	***7,555***	***26.2***
Total Umpqua National Forest	207,428	
Other Identified Projects	9,244	4.5
Pacific Connector Pipeline and Associated Facilities	1,219	0.6
Project-related Mitigation on Federal Lands	6,634	3.2
Umpqua Total Cumulative Area Impacted	***17,097***	***8.2***
ROGUE RIVER NATIONAL FOREST		
Watershed: Big Butte Creek	43,813	
Other Identified Projects	0	0
Pacific Connector Pipeline and Associated Facilities	82	0.2
Project-related Mitigation on Federal Lands	0	0
Cumulative Area Impacted	***82***	***0.2***
Watershed: Little Butte Creek	238,598	
Other Identified Projects	3,712	1.6
Pacific Connector Pipeline and Associated Facilities	649	0.3
Project-related Mitigation on Federal Lands	703	0.3
Cumulative Area Impacted	***5,064***	***2.1***
Total Rogue River National Forest	282,411	
Other Identified Projects	3,712	1.3
Pacific Connector Pipeline and Associated Facilities	731	0.3

Table 13: Cumulative Acres Impacted by Watershed by the Project, Related Mitigation Projects, and Other Projects [1/]

Activity, Fifth Field Watershed	Acres[2/]	Percent of Watershed[2/]
Project-related Mitigation on Federal Lands	703	0.2
Rogue River Total Cumulative Area Impacted	***5,146***	***1.8***
WINEMA NATIONAL FOREST		
Watershed: Spencer Creek	54,420	
Other Identified Projects	70	0.1
Pacific Connector Pipeline and Associated Facilities	231	0.4
Project-related Mitigation on Federal Lands	397	0.7
Cumulative Area Impacted	***698***	***1.3***
Total Winema National Forest	54,420	
Other Identified Projects	70	0.1
Pacific Connector Pipeline and Associated Facilities	231	0.4
Project-related Mitigation on Federal Lands	397	0.7
Winema Total Cumulative Area Impacted	***698***	***1.3***
Grand Total: Umpqua, Rogue River, Winema National Forests	544,259	
Other Identified Projects	13,026	2.4
Pacific Connector Pipeline and Associated Facilities	2,181	0.4
Project-related Mitigation on Federal Lands	7,734	1.4
Cumulative Area Impacted	**22,941**	***4.2***

1/ Other Identified Projects include only those resulting in new disturbance (e.g., continued grazing on existing allotments is not included).
2/ Minor changes to the proposed route in order to avoid survey and manage species' habitat and other sensitive resources, are on-going. Therefore, the project acres presented in this table are approximate values. Estimates of watershed level-impacts presented in this table are not expected to change based on these minor route changes.
Numbers are not exact, columns do not sum correctly due to rounding.
Table adapted from Table 4.14.3-1 of the FEIS (FERC 2015).

Wetlands

Wetlands covered as much as 2.3 million acres (3.6 percent) of what is now Oregon as of the late 1700's (Dahl 1990). Since that time, wetland acreage has decreased by more than one-third, mostly owing to conversion of wetlands to agricultural uses by diking, draining, or both. Other causes of wetland loss or degradation have been urbanization, industrial development, flood-control projects, surface-water diversion and ground-water pumping for irrigation, stream snagging, land clearing, livestock grazing, and beaver trapping (ODSL and WCSW 1995). The greatest losses were of estuarine marshes, eastern Oregon riparian wetlands, Willamette River Valley wet prairies and riparian wetlands, and Klamath Basin marshes (ODSL and OPRD 1989).

In addition to general area wetland losses, the quality of remaining wetlands has also decreased, primarily due to human activities, with complex wetlands such as riverine wetlands losing connectivity with their water sources due to roads and similar construction. A third feature, wetland plants, also indicates that wetlands are declining. ORBIC reports that 29 percent of Oregon's wetland plants are imperiled (OPB 2000). Current regulatory programs to slow wetland loss, as well as creating incentives to increase wetland health and acreage, have the potential to stop and possibly reverse current trends.

Based on Johnson and O'Neil habitat classifications, there are 583 acres of wetlands within the 700-foot analysis area, and 1,718 acres within the 3,200-foot analysis area (Tables 2 and 3). Of those, less than a hundredth of an acre would be impacted by the Project (Table 6).

Riparian Areas

There are about 114,500 miles of rivers and streams in Oregon, and their surrounding riparian areas make up almost 15 percent of the state (Oregon Water Resources Department as cited in OPB 2000). Like wetlands, the hydrologic function of streams and rivers has been altered, reducing the connection between the river and the riparian zones. Agricultural and livestock grazing practices on private lands have reduced vegetation along streams to a large extent, and increased flow rates while reducing water quality and habitat for threatened fish species (Matthews and Barnhard 1996). Human settlement and land development have drastically reduced the ecological functions of these habitats (OPB 2000). Additionally, non-native vegetation has been invading these corridors, with up to 50 percent non-native species in the Willamette riparian forests (Tabacchi et al. 1996).

Intensive human activity along the most impacted riparian corridors makes the restoration of these areas particularly difficult. Slightly more success is possible in more rural areas where conservation easements and evolving agricultural and livestock grazing practices can be more easily altered.

Based on Johnson and O'Neil habitat classifications, there are 164 acres of riparian habitat within the 700-foot analysis area, and 1,024 acres within the 3,200-foot analysis area (Tables 2 and 3). Of those, 0.36 acres would be impacted by the Project (Table 6).

6.1.3 Conservation Measures and Mitigation

Project conservation measures can be categorized into one of five "mitigation" applications, described by the Council on Environmental Quality (43 FR 55990 §1508.20, 1978):

1. Avoiding the impact altogether by not taking a certain action or parts of an action;
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or
5. Compensating for the impact by replacing or providing substitute resources or environments.

Categories 1 through 4 have occurred or would occur within the Project area, and include design features and best management practices (BMPs), while the fifth category would occur outside the Project area, and consist of off-site compensatory mitigation designed to compensate for impacts of the Project that cannot be avoided, further minimized, or otherwise mitigated.

Pacific Connector's proposed avoidance and minimization measures include re-routing the Project to avoid sensitive resources, restricting the pipeline corridor width in environmentally sensitive areas (e.g., riparian areas), utilizing UCSAs within forested habitats, and maintaining large snags and trees with cavities on the edge of the construction ROW or TEWAs where feasible. Pacific Connector would also restore affected habitats to the maximum extent practicable including restoring habitat diversity features such as cavities and snags, large woody debris (LWD), and rock and brush piles. Pacific Connector would reduce impact over time by minimizing disturbances during Project operation, including waiting until late summer or early autumn to conduct routine (every 3 to 5 years) vegetation maintenance. By avoiding, minimizing, rectifying, and reducing Project impacts to sensitive habitats, Pacific Connector would minimize impacts to the species that utilize those habitats, including many of the Forest Service sensitive species discussed in this BE.

Specific Project conservation measures, including measures proposed for construction, post-construction restoration, and operation are listed in Appendix N of the BA, and are detailed in the following plans: Pacific Connector's Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA), Waterbody Crossing Plans (Appendix W to the BA), Fish Salvage Plan (Appendix T of the BA), Blasting and Helicopter Noise Analysis and Mitigation Plan (Appendix P of the BA), Erosion Control and Revegetation Plan (ECRP; Appendix F of the BA), Draft Migratory Bird Conservation Plan (JCEP and PCGP 2015; Attachment 14a to Pacific Connector's 2/13/2015 data response filed with FERC), and FERC's Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA).

To compensate for unavoidable impacts of the Project, Pacific Connector developed a Compensatory Mitigation Plan (CMP; Appendix O of the BA), as well as an Amendment to the Draft CMP that they filed with FERC on August 13, 2015. The goal of the CMP is to compensate for unavoidable impacts to the sensitive resources through achieving No Net Loss or an overall Net Benefit for the resource. Additionally, the CMP is designed to satisfy the requirements of the National Forest Management Act and associated Land and Resource Management Plans (LRMPs), including the Northwest Forest Plan (NWFP), as well as comply with the ESA and other applicable requirements.

Specific compensatory mitigation has only been proposed for three Forest Service sensitive species discussed in this BE (Mardon skipper [*Polites mardon*], Siskiyou short-horned grasshopper [*Chloealtis aspasma*], and Upper Klamath redband trout [*Oncorhynchus mykiss newberrii*]); however, many of the measures proposed to compensate for impacts to federal land allocations such as Riparian Reserves and LSRs, listed species and their habitats, aquatic and riparian habitats, and state-specific protected species or habitats would also benefit the Forest Service sensitive species discussed here.

The Forest Service has proposed the re-allocation of nearly 1,200 acres of forested lands within the matrix land allocation be added to existing LSRs to replace the habitat impacted by the Project. This reallocation would address the "neutral to beneficial" standard for new developments in LSRs (Forest Service and BLM 1994) to offset the long-term loss of acres and

habitat from the construction and operation of the Project. This reallocation of matrix land to LSR would benefit Forest Service sensitive species associated with LO forests over time by providing additional habitat that is managed to create late successional–old growth stand conditions.

As re-allocations do not specifically mitigate for direct habitat losses or indirect effects within LSRs, the Forest Service has proposed additional projects in the CMP to mitigate for habitat losses within LSRs, in other NWFP allocated lands, and within specific habitats utilized by species listed under the ESA. These potential projects include aquatic habitat restoration (including in-stream LWD, road surfacing and drainage repair, road decommissioning, fish passage and culvert replacement) and terrestrial habitat restoration (including fuel breaks, fuel reduction projects, snag creation, weed control and treatments, and meadow restoration). These proposed mitigation projects would benefit Forest Service sensitive species by improving habitat and reducing future disturbance. These Projects are described in Table 1 and Attachment 2 of the CMP (Appendix O of the BA).

In order to replace matrix lands reallocated to LSRs as required under the various LRMPs, Pacific Connector would fund the acquisition of private land for conversion to matrix land under federal management. Although these lands would be managed for timber harvest as described, riparian and aquatic habitats within these new matrix areas would be converted to Riparian Reserves and would be subject to more stringent protections under federal management than they currently are under private ownership as dictated by state regulations (Oregon Department of Forestry 2006). Therefore these conversions of private to matrix land would benefit Forest Service sensitive species associated with riparian and aquatic habitats.

As a result of these proposed mitigation measures designed to achieve LSR objectives and standards, late-successional-old growth and aquatic habitat would benefit overall from the Project, as would the Forest Service sensitive species associated with these habitats.

6.2 Species Accounts and Analysis of Impacts

Species presented in this section were determined to require a detailed analysis of impacts based on a preliminary impact analysis. The impact determination for all species discussed here is MIIH, as defined above. Where suitable habitat was documented for a species but species-specific surveys were not conducted for that species, presence was assumed and the potential effects of the Project are analyzed here. Sensitive species observed within the Project area during surveys are also discussed here. Species that were not detected during species-specific surveys, or did not receive targeted surveys but were determined not to have any suitable habitat within the Project area, were assumed to be absent from the Project area; these species are not discussed in this section, but are listed in Table 1 and discussed in Appendix A.

Each species-specific section below is organized as follows:

1. *Species Status in the Project Area*

This section provides information on the species' range, habitat, life history, and potential presence in the Project area. *Wildlife-Habitat Relationships in Oregon and Washington*

(Johnson and O'Neil 2001) was used as a guide to provide habitat associations for mammals, birds, amphibians, and reptiles; for fish, invertebrates, vascular plants, bryophytes, fungi, and lichens, habitat associations were inferred from the data sources described above in Section 3.0. Additionally, if the species was not listed in Johnson and O'Neil (2001) then primary or peer-reviewed literature was used to describe the life history characteristics and determine habitat associations. These inferred habitat associations provide the basis for the impact analysis for each species by allowing quantification of the amount of habitat potentially impacted by the Project (Table 6). Johnson and O'Neil (2011) use two definitions to describe wildlife-habitat associations:

> ***Closely Associated.*** *A species is widely known to depend on a habitat or structural condition for part or all of its life history requirements. Identifying this association implies that the species has an essential need for this habitat or structural condition for its maintenance and viability.*

> ***Generally Associated.*** *A species exhibits a high degree of adaptability and may be supported by a number of habitat or structural conditions. In other words, the habitats or structural conditions play a supportive role for its maintenance and viability.*

Johnson and O'Neil (2001) also include "Present" as a degree of association between wildlife and habitats. This association was not included in this analysis as it indicates that a species demonstrates only occasional use of a habitat or structural condition and the habitat or structural conditions provides marginal support to the species for its maintenance and viability.

Observations of species discussed in this section were also reviewed to determine the extent of each species within each National Forest and with respect to the Project (Forest Service Natural Resource Information System [NRIS] database - Forest Service 2006, SBS 2008, SBS 2010, SBS 2011a, SBS 2011b, SBS 2011c, ORBIC 2012, PCGP April 27, 2015 response to FERC data request). An ORBIC Element Occurrence or Forest Service Wildlife Observation is defined as evidence that an animal or group of animals was present within a certain location at a point in time; the number of individuals per observation ranges from one to many, and the same individual may elicit several observations over time (Forest Service 2006, ORBIC 2012). Similarly, plant sites in the Forest Service and ORBIC database reflect locations containing one to many individuals. These records were analyzed to determine the proportion of each species' known locations that have the potential to be impacted by the Project, and thus the likelihood of population-level impacts resulting from the Project.

If a species was documented during field surveys, these field observations are also discussed here. The location of each observation in relation to the Project is presented, where applicable, in order to determine the effect the Project would have on the species.

2. Analysis of Effects

This section provides an analysis of direct, indirect, and cumulative effects to each species in addition to the global discussion of impacts above.

3. Conservation Measures

This section describes the proposed minimization and off-site compensatory mitigation measures that apply to each species. These measures conform to applications 2 through 5 in Section 6.1.3, above and do not reiterate the avoidance measures (application measure 1) discussed in the action alternatives Section 2.0. For a detailed discussion of conservation measures and off-site mitigation, see the Conservation Measures (Appendix N of the BA), the CMP (Appendix O of the BA), and the Amendment to the Draft CMP (Appendix F-2 of the FEIS; FERC 2015). These measures as they apply to the Forest Service sensitive species are also summarized above in Section 6.1.3, including a list of the various environmental plans developed to guide construction, post-construction restoration, and operation practices.

4. Impact Determination

This section lists the impact determination made for each species based on the above analysis. There are four possible outcomes for each sensitive species. No Impact (NI), May Impact Individuals or Habitat but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (MIIH), Will Impact Individuals or Habitat with a consequence that the action will contribute to a trend toward Federal listing or cause a loss of viability to the population or species (WOFV), or Beneficial Impact (BI).

6.2.1 Mammals

Surveys were not conducted specifically for sensitive mammals except for the red tree vole (*Arborimus longicaudus*). The red tree vole is designated as a Survey and Manage species and discussed in a separate report. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2012), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS database (Forest Service 2006).

6.2.1.1 *Pallid bat (Antrozous pallidus)*

Species Status in the Project Area

The pallid bat ranges from central Mexico and north to the southern Okanagan Valley of British Columbia (Orr 1954, Hermanson and O'Shea 1983, Verts and Carraway 1998). In Oregon, pallid bats have been documented in the western interior valleys and east of the Cascades excluding the Blue Mountains (McLaren 2001). As shown in Table 1, the species has been detected on the Umpqua, Winema, and Rogue River national forests. The pallid bat has been observed twice within 1 mile and three times within 1-5 miles of the Project in the Umpqua National Forest (Forest Service 2006, ORBIC 2012).

The pallid bat inhabits arid regions, and is less abundant in evergreen and mixed conifer woodlands. Pallid bats typically use cliff-faces, caves, mines, or buildings for roosts (Csuti et al. 2001). While night roosts can include buildings, rock overhangs, bridges, caves and mines, Lewis (1994) found a high proportion of her study individuals in Oregon under bridges. Pallid bat maternity roosts have been found in ponderosa pine snags (Rabe et al. 1998), in rock crevices,

within spaces behind exfoliating rock, and "potholes" in rock-overhangs (Lewis 1996). Young are born in May and June, fly at 6 weeks, and are weaned in 6 to 8 weeks. This species is thought to hibernate in the winter (NatureServe 2013).

Habitat loss from urbanization, conversion of sagebrush-steppe, and agricultural expansion is likely a limiting factor on pallid bats, particularly due to reduction of foraging habitats (Chapman et al. 1994). In addition to direct habitat loss, the indirect effects from fire suppression modify the forest-valley transition area.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable pallid bat habitats within 3,200 feet of the proposed pipeline, within the three national forests crossed by the Project. While pallid bats are particularly associated with habitats that include edges where snags, cliffs, caves, and tree cavities are present, Table 14 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 14. Pallid Bat Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	312.20	93.17	11,980	3.38%
Ponderosa Pine Forests and Woodlands	Generally Associated	Feeds and Breeds	0.01	0.00	958	0.00%
Western Juniper/Mountain Mahogany Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-steppe	Closely Associated	Feeds and Breeds	6.75	0.62	9	79.64%
Eastside Grasslands	Generally Associated	Feeds and Breeds	1.29	0.00	3 [3/]	50.41% [3/]
Herbaceous wetlands	Closely Associated	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Generally Associated	Feeds	0.08	0.00	40	0.20%
Eastside Riparian-Wetlands	Closely Associated	Feeds and Breeds	0.28	0.00	224	0.13%

Table 14. Pallid Bat Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.53	0.09	207	0.30%
Total			**321.15**	**93.89**	**13,448**	**3.09%**

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Overall, about 3 percent of available habitat within the analysis area would be impacted by the Project (Table 14). There are no known hibernacula or maternity colonies near the Project. As noted above, pallid bats have been documented using ponderosa pine snags as maternity colonies. A minimal amount of ponderosa pine habitat would be impacted by the Project (0.01 acres) so loss of undocumented maternity roost sites is expected to be minimal. Pallid bats are also associated with other forested habitats that would be more greatly impacted. It is possible that timber clearing in these areas could cause loss of potential roost trees.

ROW clearing could cause direct mortality of roosting bats if bats were in a tree that was cleared. Bats could also be disturbed by noise during timber clearing and construction if they were roosting nearby. This disturbance could have negative energetic effects if bats needed to relocate to avoid the disturbance, especially if disturbed during hibernation. As timber clearing would be restriction to outside the core migratory bird breeding season (April 1 -July 15), removal of active maternity colonies is not expected.

As described in Section 6.1.2.1 above, construction in a given location would take approximately 8 weeks including all phases. Although timber clearing would be restriction to outside the core migratory bird breeding season (April 1 -July 15), construction could occur any time of the year. Pallid bats could partially benefit from ROW clearing as they forage in open areas.

Cumulative Effects

The pallid bat cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 13). Past harvest techniques removed large trees that may have served as pallid bat roosts, maternity colonies and winter hibernacula. Suitable foraging habitat may also have decreased due to past clearcut forest management.

Construction of the pipeline and associated facilities would affect 2,181 acres within the pallid bat cumulative effects analysis area (Table 13). This reflects 0.4 percent of the total watershed area. Although trees and snags would be cleared during Project construction, these represent a small portion of the species' overall available roost sites, and these would be replaced through 1,029 acres of snag creation. Replacement would be immediate, though there would be up to a 10-year delay as snag decay occurs. Approximately 476 acres outside of the 30-foot maintenance corridor would be restored following construction and allowed to return to pre-construction conditions where not on Matrix lands. Forested areas impacted during construction, including potential roosting habitat, would take decades to recover, while open habitats such as grasslands would recovery relatively quickly. Of the 476 acres that would be restored after construction, 86 percent are forested, and the remaining 14 percent are grassland or otherwise non-forested. Construction noise disturbance to roost sites, though of short duration (approximately 8 weeks at a given location), could impact individuals locally. However, as no known communal roost sites or colonies have been documented within the Project area, impacts to large numbers of roosting bats are not expected.

Proposed mitigation actions on federal lands that would affect resources used by the pallid bat include snag creation, road closure, fuels reduction, fire suppression, reallocation of matrix to LSR, riparian vegetation planting, and LWD upland placement projects. Mitigation actions on federal lands would affect 7,734 acres within the pallid bat cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). There could be some negative short-term impacts of these actions, including disturbance during implementation, such as during fuels reduction projects. However, overall, these projects would benefit the pallid bat through habitat improvements and a reduction in disturbance over the long term. Snag creation projects would result in the creation of potential roost sites, road closures would reduce disturbance to individuals if present, fuels reduction and fire suppression projects would result in a reduction of potential habitat loss through fire, and planting of riparian vegetation would improve habitat quality for the pallid bat at these sites. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Planned projects within the pallid bat cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). They would affect 13,026 acres, or 2.4 percent of the cumulative effects analysis area. The pre-commercial thinning and timber projects in the national forests would most likely contribute to the long term health of the forest ecosystems; similarly, the fuel break project would improve habitat quality for pallid bats through improved fire management. Under the NWFP, LSRs and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the pallid bat cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action, as well as reasonably foreseeable actions, would not result in additional habitat loss from urbanization, conversion of sagebrush-steppe, and agricultural expansion, which are likely the limiting factors

for pallid bats (Chapman et al. 1994). Therefore, cumulative impacts on the pallid bat are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts include revegetating the understory with grasses and shrubs, restoring wetlands, and encouraging insect recolonization (see Appendices C and F of the BA). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1 -July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1 - July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any roosting bats and maternity colonies in those areas (approximately 30 percent of route, see Appendix N and P of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Riparian Reserves provide suitable foraging and roosting habitat. For a full description of CMP activities that would benefit the bat species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the pallid bat are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the pallid bat because of the minimal percentage of available habitat to be impacted (about 3 percent) with which the species is associated.

6.2.1.2 *Townsend's big-eared bat (Corynorhinus townsendii)*

Species Status in the Project Area

The Townsend's big-eared bat occurs throughout western North America (Woodruff and Ferguson 2005). Townsend's big-eared bats are a common species in Oregon and can be found wherever suitable habitat exists, excluding the Blue Mountains and West Basin Range (McLaren 2001). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. Townsend's big-eared bat has been observed three times within 1 mile of the Project in the Rogue River National Forest; there have been no observations of the Townsend's big-eared bat within 5 miles of the Project in either the Winema or the Umpqua National Forest (Forest Service 2006, ORBIC 2012).

Use of roost sites by Townsend's big-eared bats is variable within seasons and among years (Piaggio 1998). Townsend's big-eared bats roost primarily in caves, cracks or crevices in rocks,

abandoned mines, abandoned buildings and open attics (Barbour and Davis 1969, Nagorsen and Brigham 1993, Pierson et al. 1996). Although caves and mines are considered to be preferred day roosts (Pierson et al. 2001), Keely and Tuttle (1999) reported high use of bridges as day and night roosts by Townsend's big-eared bats in southwestern Oregon. Townsend's big-eared bats show little fidelity to interim roosts, but the species is highly loyal to maternity roosts (Fellers and Pierson 2002). In Washington and Oregon, this species is known to utilize individual caves for both maternity roosts and winter hibernation (Woodruff and Ferguson 2005). Young are born from mid-April through late July, fly within a month, and are weaned within two months. This species hibernates from early fall through early spring (NatureServe 2013).

The primary threat to the Townsend's big-eared bat is disturbance and destruction of roost sites through recreational caving, mine exploration, mine reclamation and renewed mining in historical districts. Studies in Oregon and California indicate that current and historical colonies exhibited moderate to sizable decreases in numbers following human visitation and renewed mining (Piaggio 1998). Additionally, the loss of old buildings, barns, warehouse, silos and other buildings and the physical closure or reactivation of mines reduces available roost sites (Woodruff and Ferguson 2005).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Townsend's big-eared bat habitats within 3,200 feet of the proposed pipeline, in the three national forests crossed by the Project. While Townsend's big-eared bats are particularly associated with habitats that include ecotones where cliffs and caves are present, Table 15 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 15. Townsend's big-eared Bat Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Lowland Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Montane Mixed Conifer Forests	Generally Associated	Feeds and Breeds	80.63	26.39	833	12.84%
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	312.20	93.17	11,980	3.38%
Ponderosa Pine Forests And Woodlands	Generally Associated	Feeds and Breeds	0.01	0.00	958	0.00%
Westside Oak-Dry Douglas-fir Forests and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%

Table 15. Townsend's big-eared Bat Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Western Juniper/Mountain Mahogany Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-Steppe	Generally Associated	Feeds and Breeds	6.75	0.62	9	79.64%
Westside Grasslands	Generally Associated	Feeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Grasslands	Generally Associated	Feeds and Breeds	1.29	0.00	3	50.41% [3/]
Herbaceous Wetlands	Generally Associated	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Generally Associated	Feeds	0.08	0.00	40	0.20%
Eastside Riparian Wetlands	Generally Associated	Feeds	0.28	0.00	224	0.13%
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.53	0.09	207	0.30%
Total			**404.31**	**120.60**	**14,292**	**3.67%**

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

There are no known hibernaculum or maternity roosts within the analysis area, but they could potentially occur and not be documented. Approximately 4 percent of the habitat available to this species within the analysis area would be impacted by the Project (Table 15). Cave roost sites are sparsely located across the Project area and are not likely to be encountered during construction activities.

Construction noise could disturb roosting bats. Particularly sensitive to disturbance, females have been known to permanently abandon summer roosts when disturbed. Nursery colonies, located in caves, mines, or buildings, can contain up to several hundred bats, and thus a large number of individuals could potentially be affected if noise disturbance causes a group to abandon its roost, particularly the young which may not yet be able to live independently of their mothers (Nagorsen and Brigham 1993). Noise disturbance would only be temporary, however, and habitat would become suitable once the noise ceased. Due to this species' mobility and wide habitat preferences, it should be able to temporarily relocate to other areas during construction fairly easily and without population-scale impacts. Townsend's big-eared bats could be directly affected during pipeline construction if hibernating bats are disturbed and aroused

from torpor as this could possibly lower their fitness during winter, potentially increasing mortality, and decreasing fecundity.

Cumulative Effects

The Townsend's big-eared bat cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 13). Suitable habitat for this species, including forested and wetland habitats, have decreased in complexity and abundance from historical conditions due to widespread timber clearing, settlement patterns, and fire suppression.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Approximately 476 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands). Construction noise disturbance to roost sites, though of short duration (approximately 8 weeks at a given location), could impact individuals locally. However, as no known communal roost sites or colonies have been documented within the Project area, impacts to large numbers of roosting bats are not expected.

Mitigation actions proposed for federal lands that affect resources used by the Townsend's big-eared bat include road closure, fuels reduction, fire suppression, reallocation of matrix to LSR, riparian vegetation planting, and LWD upland placement projects. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). Potential negative impacts include disturbance during implementation of these projects, such as during fuels reduction projects. However, these projects would overall benefit the Townsend's big-eared bat through habitat improvements and a reduction in disturbance over the long term. Road closures would reduce disturbance to individuals if present; fuels reduction and fire suppression projects would result in a reduction of potential habitat loss through fire; and planting of riparian vegetation would improve habitat quality for the Townsend's big-eared bat at these sites. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). They would affect 13,026 acres, or 2.4 percent of the watersheds. The pre-commercial thinning and timber projects in the national forests would most likely contribute to the long term health of the forest ecosystems; similarly, the fuel break project would improve habitat quality for Townsend's big-eared bats through improved fire management. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres overlapping reasonably foreseeable activities, approximately 22,941 acres within the cumulative effects analysis area would be affected, or 4.2 percent of the total watershed area (Table 13). The proposed action as well as the actions described above would not contribute to disturbance of caves which is the primary threat to this species.

Additionally, impacts to unidentified roost sites, if any, would be short term, lasting a maximum of approximately 8 weeks through Project construction. Therefore, cumulative impacts on the Townsend's big-eared bat are expected to be insignificant because the combined impacts to the 4.2 percent of the watershed area, including short-term disturbance effects, are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts include revegetating the understory with grasses and shrubs, restoring wetlands, and encouraging insect recolonization (see Appendices C and F of the BA). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1 -July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1 - July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any roosting bats and maternity colonies in those areas (approximately 30 percent of route, see Appendix N and P of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Riparian Reserves provide suitable foraging and roosting habitat. For a full description of CMP activities that would benefit the bat species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the Townsend's big-eared bat are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Townsend's big-eared bat because of the minimal percentage of available habitat to be impacted (about 4 percent) with which the species is associated, and the lack of impact to caves which is the primary threat to this species.

6.2.1.3 *Fringed myotis (Myotis thysanodes)*

Species Status in the Project Area

The fringed myotis ranges throughout much of western North America from southern British Columbia to Mexico, and from California, east to South Dakota (Bradley and Ports 1998, Rabe et al. 1998, Cryan et al. 2000). In Oregon, fringed myotis can be found in the Coast Range and in the northeastern corner of the state (McLaren 2001). Although widely distributed throughout western North America, the fringed myotis is considered rare in the northern portion of its range (Barbour and Davis 1969, USDA and USDI 1993, McLaren 2001). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. The fringed

myotis has been observed once within 1 mile and once within 1-5 miles of the Project in the Rogue River National Forest and once within 1-5 miles of the Project in the Winema National Forest; it has not been observed within 5 miles of the Project in the Umpqua National Forest (Forest Service 2006, ORBIC 2012).

Fringed myotis roost in crevices in buildings, underground mines, rocks, cliffs faces, and bridges (Bradley and Ports 1998, Cryan et al. 2001). Roosting in decadent trees and snags, particularly large ones, is common throughout its western range. In the Pacific Northwest, the fringed myotis is not considered a tree-roosting bat (Nagorsen and Brigham 1993). Fringed myotis in the Pacific Northwest generally roost in more abundant albeit less permanent abandoned buildings and caves (Lewis 1995), although Weller and Zabel (2001) found fringed myotis roosted primarily in snags in northern California. Maternity roosts are colonial with colonies ranging from 10 to 2,000 individuals, though large colonies are exceedingly rare. Much less information is available on roosts of males, but it is thought that they roost singly or in small groups (Weller 2005). Fringed myotis move within roost sites, maximizing their thermoregulation and reproductive behavior (O'Farrell and Studier 1980). Young are born in late June to mid-July and young can fly at 16-17 days. Colonies begin to disperse by October, and bats are likely hibernating after mid-October (NatureServe 2013).

Threats to the fringed myotis primarily consist of loss or modification of roosting habitat, including closure or renewed activity at abandoned mines, recreational caving and mine exploration, loss of large, decadent trees and replacement of buildings and bridges with non-bat-friendly structures (Bradley and Ports 1998). Removal of large blocks of forest habitat also threatens the fringed myotis by removing foraging habitat (Bradley and Ports 1998).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable fringed myotis habitats within 3,200 feet of the proposed pipeline, in the three national forests crossed by the Project. While fringed myotis are particularly associated with habitats that include edges, snags, cliffs, caves, and tree cavities, Table 16 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 16. Fringed Myotis Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland-Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	312.20	93.17	11,980	3.38%

Table 16. Fringed Myotis Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Ponderosa Pine Forests and Woodlands	Generally Associated	Feeds and Breeds	0.01	0.00	958	0.00%
Westside Oak-Dry Douglas-Fir Forests and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-Steppe	Generally Associated	Feeds and Breeds	6.75	0.62	9	79.64%
Eastside Grasslands	Generally Associated	Feeds	1.29	0.00	3 [3/]	50.41% [3/]
Herbaceous Wetlands	Generally Associated	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.08	0.00	40	0.20%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.28	0.00	224	0.13%
Open Water-Lakes, Rivers, and Streams	Generally Associated	Feeds	0.53	0.09	207	0.30%
Total			**321.15**	**93.89**	**13,448**	**3.09%**

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2 Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

There are no known hibernaculum or maternity roosts within the analysis area, but they could potentially occur and not be documented. Cave roost sites are sparsely located across the Project area and are not likely to be encountered during construction activities. Approximately 3 percent of the habitat available to this species within the analysis area would be impacted by the Project (Table 16). In terms of potential roosting habitat, approximately 0.8 percent of late-successional old-growth in the analysis area would be impacted (Tables 3 and 6), and 1.74 percent of snags present within the analysis area would be impacted by the Project (Appendix D). About 3.1 percent of forested habitats available in the analysis area would be impacted that could serve as potential foraging habitat Individuals could be killed or injured if snags are removed or destroyed while occupied by roosting bats. These percentages of habitats impacted represent a small portion of habitat available in the analysis area. Additionally, trees and snags are not typically primary roost habitats for fringed myotis, as they more typically use caves, buildings, and bridges for roosting.

Construction of the Project and associated noise would extend approximately 8 weeks at any given location, and could occur at any time of the year. Fringed myotis are sensitive to disturbance, particularly at maternity colonies. Disturbance of hibernating bats could cause a

reduction in fitness during winter when they must use their body reserves to survive. While disturbance could render habitat temporarily unsuitable or have adverse energetic impacts on bats; these impacts would be temporary and occur in a narrow swath of otherwise suitable habitat.

Cumulative Effects

The fringed myotis cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 13).This species is widespread in western North America and population trend is stable, but its abundance appears to be low (NatureServe 2013). Suitable habitat for this species including forested and wetland habitats have decreased from historical conditions due to widespread timber clearing and settlement patterns in the region.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Although trees and snags would be cleared during Project construction, these represent a small portion of the species' overall available roost sites and would be replaced through mitigation efforts. Specifically, as described above under the pallid bat, snag creation would be implemented across 1,029 acres as mitigation for snags removed by the Project. Forested areas impacted by construction of the pipeline, including potential roosting habitat, are expected to take decades to recover, while open habitats such as grasslands would recovery relatively quickly. Approximately 476 acres outside of the 30-foot maintenance corridor would be restored following construction and allowed to return to pre-construction conditions where not on Matrix lands. This area consists primarily of forested habitat (86 percent), as well as some non-forested habitat (14 percent). Construction noise disturbance to roost sites, though of short duration, could impact individuals locally. However, as no known communal roost sites or colonies have been documented within the Project area, impacts to large numbers of roosting bats are not expected.

Mitigation actions proposed for federal lands that affect resources used by the fringed myotis include snag creation, road closure, fuels reduction, fire suppression, reallocation of matrix to LSR, riparian vegetation planting, and LWD upland placement projects. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effect analysis area, or 1.4 percent of the total watershed area (Table 13). Potential negative impacts include disturbance during implementation of these projects, such as during fuels reduction projects. However, these projects would overall benefit the fringed myotis through habitat improvements and a reduction in disturbance over the long term. Snag creation projects would result in the creation of potential roost sites; road closures would reduce disturbance to individuals if present; fuels reduction and fire suppression projects would result in a reduction of potential habitat loss through fire; and planting of riparian vegetation would improve habitat quality for the fringed myotis at these sites. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). They would affect 13,026 acres, or 2.4 percent of the watersheds. The pre-commercial thinning and timber projects in the national forests would most likely contribute to the long term health of the forest ecosystems, although they could represent additional loss of habitat for this species through loss of large trees and snags. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres overlapping reasonably foreseeable activities, approximately 22,941 acres within the cumulative effects analysis area, or 4.2 percent of the total watershed area (Table 13). The proposed action as well as the actions described above would not contribute to the closure or renewed activity at abandoned mines, recreational caving and mine exploration, and replacement of buildings and bridges with non-bat-friendly structures, which are threats to this species (Bradley and Ports 1998). The proposed Project as well as planned projects would contribute to the loss of large, decadent trees, as well as result in the removal of foraging habitat which are also threats to this species; however, these impacts would be mitigated through snag creation and other habitat enhancements. Therefore, cumulative impacts on the fringed myotis are expected to be insignificant because the combined impacts to the 4.2 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts include revegetating the understory with grasses and shrubs, restoring wetlands, and encouraging insect recolonization (see Appendices C and F of the BA). Noise disturbance from blasting would be minimized with the use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1 -July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1 - July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit any roosting bats and maternity colonies in those areas (approximately 30 percent of route, see Appendix N and P of the BA).

In the Umpqua and Rogue River national forests, approximately 7,500 snags would be created in LSR and matrix lands by blasting the tops off live trees or inoculating trees with heart rot decay fungi. Increased snags densities would provide bats with more roost opportunities. For a full description of CMP activities that would benefit the bat species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the fringed myotis are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for fringed myotis because of the low percentage of potential habitat in the analysis area being impacted (about 3 percent) and mitigation efforts to create snags.

6.2.2 Birds

Surveys were not conducted specifically for special status birds except for the great gray owl (*Strix nebulosa*); however, special status species were documented if observed during other survey activities. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2012), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS databases (Forest Service 2006).

6.2.2.1 *Red-necked grebe (Podiceps grisegena)*

Species Status in the Project Area

This waterbird breeds throughout southern and central Alaska and much of Canada, to the northern U.S. Their winter range is along the Pacific coast from the Aleutian Islands to Los Angeles, California, the Atlantic coast from Newfoundland to North Carolina, and the shores of Lake Ontario. The only consistent breeding in Oregon is by a group of five to 20 birds in Upper Klamath Lake National Wildlife Refuge (NWR). During the winter, red-necked grebes can be found in larger numbers along the coast, and are rarely found away from the coast (Spencer 2003a). As shown in Table 1, the species has been documented in the Umpqua and Winema national forests; and has not been documented and is not suspected to occur in the Rogue River National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the red-necked grebe within 5 miles of the Project on NFS lands (Forest Service 2006, ORBIC 2012). No red-necked grebes have been recorded on Breeding Bird Survey (BBS) routes within 50 miles of the Project in Bird Conservation Region (BCR) 5 (Northern Pacific Rainforest, from MP 1.5R to MP 168) or BCR 9 (Great Basin, from MP 168 to MP 228.1) during the past 20 years (Sauer et al. 2014).

Historical information on this species is limited; breeding populations in Oregon were first documented in 1945 (Marshall et al. 2003). Breeding habitat consists of clear, deep marshy lakes and ponds in timbered regions (Table 17; Johnson and O'Neil 2001). At Upper Klamath Lake, emergent vegetation is dominant, and pondweed and waterweed are common (Spencer 2003a). Winter habitat consists of estuaries and protected waters along the coast (Spencer 2003a). Fish make up 50 to 75 percent of adults' diets. Other important foods are insects, crustaceans, and occasionally vegetation (Spencer 2003a).

As predators, red-necked grebes are susceptible to bioaccumulation of pollutants such as organochlorides and heavy metals, and they are also vulnerable to oil spills. A potentially important source of mortality to this diving bird is bycatch in commercial fishing nets. Other

threats to red-necked grebes are degradation of habitat and disturbance. Farming, road-building, and development have destroyed breeding habitat, while pollution is a problem at some wintering areas. Disturbance has associated with reduced productivity at some sites (Stout and Neuchterlein 1999). Within the western region, populations have increased 1.2 percent annually between 2001 and 2011 (Sauer et al. 2012).

Analysis of Effects

Direct and Indirect Effects

The analysis area for this species includes all suitable red-necked grebe habitat within 3,200 feet of the proposed pipeline, in Umpqua and Winema national forests. Table 17 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 17. Red-necked Grebe Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Herbaceous Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Closely Associated		0.08	0.00	6	1.44%
Eastside Riparian Wetlands	Closely Associated		0.28	0.00	224	0.13%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds and Breeds	0.39	0.00	152	0.26%
Total			**0.76**	**0.00**	**410**	**0.19%**

1/ Totals taken from Table 6 for the Umpqua and Winema national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Umpqua and Winema national forests in which the species has been documented to occur; does not include habitat located in the Rogue River National Forest or on other federal or non-federal lands.

While this table represents impacts to general habitats that red-necked grebe may use that would be impacted by the Project, areas of known use by red-necked grebes would not be impacted by the Project. Specifically, the population at Upper Klamath Lake NWR and the few records from Howard Prairie Reservoir would not be impacted by the Project because both of these locations occur well away (greater than 10 miles) from any Project impacts. One bird summered on Fish Lake in Jackson county in 1989, but this lake would also be avoided by about 2 miles by the Project centerline. However, Fish Lake is a proposed hydrostatic test water source, with locations proposed for both the east and west ends of the lake. The Project should

also not contribute to pollution of either of these waterbodies, which could pose an added threat to the species.

If red-necked grebes were to occur near the Project, they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, because grebes are a mobile species, they should be able to move away from Project construction activities and not be directly affected.

Cumulative Effects

The red-necked grebe cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua and Winema national forests (Table 13). Development activities that degrade foraging and nesting habitat as well as indirect effects such as noise disturbance continue to threaten the red-necked grebe. Development has concentrated around bodies of water, increasing disturbance, eliminating habitat, and encouraging the spread of mesopredators. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990). Additionally, although the Klamath Basin has lost nearly 80 percent of its wetlands, 15,000 acres of wetlands and open water within the Upper Klamath NWR where this species is known to occur are protected. FWS manages the site for the conservation and recovery of endangered, threatened, sensitive species and the habitats on which they depend, including the red-necked grebe.

Construction of the pipeline and associated facilities would affect 1,450 acres within the cumulative effects analysis area (Table 13). However, no red-necked grebe nesting or overwintering sites are known from within these 5th field watersheds, so Project effects are expected to be limited.

Mitigation actions proposed for federal lands that affect resources used by the red-necked grebe include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on federal lands would affect 7,031 acres the cumulative effects analysis area, or 2.7 percent of the total watershed area (Table 13). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the red-necked grebe, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore shade over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the horned grebe. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). They would affect 9,314 acres, or 3.6 percent of the

watersheds. The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that would benefit grebe habitat within the watershed. Under the NWFP, Riparian Reserves in the area are likely to improve habitat for this species over time. Further, standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable red-necked grebe habitat on NFS lands.

The proposed Project, including mitigation actions, would affect approximately 8,481 acres. Combined with 9,314 acres overlapping reasonably foreseeable activities, approximately 17,795 acres within the cumulative effects analysis area would be affected, or 6.8 percent of the total watershed area (Table 13). The proposed action as well as the actions described above could affect a minimal amount of potential habitat, but would not impact known red-necked grebe use areas. Therefore, cumulative impacts on the red-necked grebe are expected to be insignificant because the combined impacts to the 6.8 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize any potential Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA). For a full description of CMP activities that would benefit the species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the red-necked grebe are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the red-necked grebe because all known breeding sites are being avoided, and if birds were encountered, only about 0.2 percent of habitat available within the analysis area would be impacted by the Project.

6.2.2.2 *Horned grebe (Podiceps auritus)*

Species Status in the Project Area

This small grebe breeds in Alaska and parts of western Canada south to eastern Oregon and Idaho. During winter, in the west, it can be found along the Pacific coast from the Aleutians to Mexico, and inland to New Mexico and Colorado. In Oregon, horned grebes have been present in late June at Upper Klamath Lake, uncommonly along lakes, reservoirs, and large rivers in the spring and fall, and commonly along the coast in winter (Marshall et al. 2006). As shown in Table 1, the species has been documented on the Umpqua and Winema national forests; it has not been documented and is not suspected to occur in the Rogue River National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the horned

grebe within 5 miles of the Project on Forest Service lands (Forest Service 2006, ORBIC 2012). No horned grebes have been recorded on BBS routes within 50 miles of the Project in BCR 5 during the past 20 years, and 2 horned grebes were recorded on routes in BCR 9 during the past 20 years (Sauer et al. 2014).

Breeding habitat consists of small (< 25 acres), semi-permanent, shallow freshwater ponds and marshes with emergent vegetation, especially sedges, rushes, and cattails, and areas of open water (Table 18; Stedman 2000, Johnson and O'Neil 2001, Spencer 2003b). Slightly brackish areas can also be used. During winter, they are usually found on saltwater, often inshore, though also on fresh water (Stedman 2000). In the summer, horned grebes eat aquatic arthropods, and in the winter they eat fish and crustaceans.

The most serious threats to winter range suitability are oil spills and pesticide accumulation. Losses of breeding habitat are also serious in some areas due to mowing of aquatic vegetation and eutrophication due to fertilizer runoff (Stedman 2000). Horned grebes will also abandon lakes heavily used by humans for recreation. Substantial losses are reported due to incidental take in fishing nets, and some losses have been reported due to toxins including pesticides, and oil spills (Stedman 2000). Within the western region, populations have declined 4.5 percent annually between 2001 and 2011 (Sauer et al. 2012).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable horned grebe habitats within 3,200 feet of the proposed pipeline, in the Umpqua and Winema national forests. Table 18 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 18. Horned Grebe Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Herbaceous Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	28	0.01%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds and Breeds	0.39	0.00	152	0.26%
Total			**0.40**	**0.00**	**180**	**0.22%**

1/ Totals taken from Table 6 for the Umpqua and Winema national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Umpqua and Winema national forests in which the species has been documented to occur; does not include habitat located in the Rogue River National Forest or on other federal or non-federal lands.

While this table represents impacts to general habitats that horned grebe may use that would be impacted by the Project, areas of known use by horned grebes would not be impacted by the

Project. Specifically, the potentially breeding population at Upper Klamath Lake NWR is about 15 miles from the Project. The Project should also not contribute to pollution of waterbodies, which could contribute to existing threats to the species.

Wintering birds could potentially be disturbed by Project construction; however, they should be able to move away from Project construction activities and would only be temporarily affected. Disturbance at any given location would last approximately 8 weeks over the entire construction period, and could occur at any time of year (Section 6.1.2.1).

Cumulative Effects

The horned grebe cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua and Winema national forests (Table 13). Breeding habitat in Oregon has been decreased from historical levels due to filling of wetlands and development. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990). Additionally, similarly to the red-necked grebe, the wetland conservation and species management at the Upper Klamath NWR has, and should continue to benefit the horned grebe (FWS 2013).

Construction of the pipeline and associated facilities would affect 1,450 acres within the 5th field watersheds where the Project crosses national forests where this species has been documented, or 0.6 percent of the total watershed area (Table 13). However, no areas of known horned grebe use occur within these 5th field watersheds.

Mitigation actions proposed for federal lands that affect resources used by the horned grebe include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on federal lands would affect 7,031 acres within the cumulative effects analysis area, or 2.7 percent of the total watershed area (Table 13). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the horned grebe, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore shade over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the horned grebe. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). They would affect 9,314 acres, or 3.6 percent of the watersheds. The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that could potentially benefit

grebe habitat within the watershed. The NWFP protects streams, rivers, and wetlands, and land use designations including Riparian Reserves and associated management practices on Forest Service land would likely increase the amount and integrity of these habitats used by horned grebes.

The proposed Project, including mitigation actions, would affect approximately 8,481 acres. Combined with 9,314 acres overlapping reasonably foreseeable activities, approximately 17,795 acres within the cumulative effects analysis area would be affected, or 6.8 percent of the total watershed area (Table 13). The proposed action as well as the actions described above could affect a minimal amount of potential habitat, but would not impact known horned grebe use areas.

Therefore, cumulative impacts on the horned grebe are expected to be insignificant given the distance away from the forests at which breeding or wintering horned grebes would typically spend time, and because the combined impacts to the 6.8 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

As noted above, contamination of waterbodies is a noted threat to horned grebes. Specific conservation measures that would help minimize any potential Project-related impacts from spills are described in Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). For a full description of CMP activities that would benefit the species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the horned grebe are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for horned grebe because they are not known to breed near the Project, and only about 0.2 percent of potential habitat in the analysis area where birds could experience winter disturbance would be impacted.

6.2.2.3 *American white pelican (Pelecanus erythrorhynchos)*

Species Status in the Project Area

The breeding range of the American white pelican includes scattered locations in the Great Plains region of Canada and the U.S. During winter, they are found in California south of the San Francisco Bay, and along the coast south to the Yucatan peninsula. In Oregon, they regularly breed at Malheur, Lower Klamath, and Upper Klamath NWRs. Post breeding, birds are found throughout eastern Oregon and occasionally in western Oregon. As shown in Table 1, the species has been documented in the Rogue River and Winema national forests; it has not been documented and is not suspected to occur in the Umpqua National Forest. Multiple observations of the American white pelican have been documented within 1-5 miles of the

Project in the Rogue River National Forest near Fish Lake (Forest Service 2006, ORBIC 2012, Colyer 2014). Three white pelicans have been recorded on BBS routes within 50 miles of the Project in BCR 5 during the past 20 years, but an average of 47 per year were recorded on routes in BCR 9 during the past 20 years (Sauer et al. 2014).

During breeding, typical habitat is isolated islands or floating reed mats in freshwater lakes (Table 19; Johnson and O'Neil 2001). Nesting has been recorded on islands vegetated with greasewood, saltgrass, and Great Basin wild rye (Paullin et al. 1988). The diet of the American white pelican is largely made up of fish. Foraging habitat is shallow marshes, lakes, rivers, and canals, especially near dams, gates, and pipes, where fish congregate (Knopf and Evans 2004).

There are many threats to this species; deaths at Malheur NWR resulted from botulism, power line strikes, and possibly starvation (Herziger and Ivey 2003). Fluctuating water levels have caused chick stranding, nest flooding, and can contribute to erosion of nesting islands (Herziger and Ivey 2003). Pelicans are also highly sensitive to disturbance; over 800 nests were abandoned at Malheur Lake in 1988 after trespassers visited a colony by canoe (Herziger and Ivey 2003). In Oregon, populations have declined 4.19 percent annually between 2002 and 2011 (Sauer et al. 2012).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable American white pelican habitats within 3,200 feet of the proposed pipeline, in the Rogue River and Winema national forests. Table 19 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 19. American White Pelican Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Herbaceous Wetlands	Generally Associated	Feeds	0.00	0.00	27	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds and Breeds	0.16	0.09	186	0.13%
Total			**0.16**	**0.09**	**213**	**0.12%**

1/ Totals taken from Table 6 for the Rogue River and Winema national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River and Winema national forests in which the species has been documented to occur; does not include habitat located in the Umpqua National Forest or on other federal or non-federal lands.

While this table represents impacts to general habitats that the American white pelican may use that would be impacted by the Project, areas of known use by pelicans would not be impacted

by the Project. Specifically, known breeding locations are about 8 to 10 miles from the Project (Lower Klamath and Upper Klamath NWR, respectively), so no impacts would be expected.

Pelicans have also been observed multiple times at Fish Lake (Colyer 2014) which is located about 2 miles north of the Project centerline. Fish Lake is also a proposed hydrostatic test water source, with locations proposed for both the east and west ends of the lake. Pacific Connector would use locally-sourced water for hydrostatic testing. To allay concerns about lowering water levels and associated impacts on pelicans, we note that Pacific Connector would need a permit from the Oregon Water Resources Department, and the application would be reviewed by ODFW for concerns related to wildlife species and their habitat.

Nonbreeding American white pelicans could be disturbed by pipeline construction if they are present in the area. However, they should be able to move away from Project construction activities and would only be temporarily affected. Disturbance at any given location would last approximately 8 weeks over the entire construction period, and could occur at any time of year (Section 6.1.2.1). Of habitat that American white pelicans could potentially use in the analysis area, about 0.1 percent would be impacted by the Project.

Cumulative Effects

The American white pelican cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Winema and Rogue River national forests (Table 13). Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, loss of estuarine wetlands has slowed substantially since the mid-1900s with increased protection (ODSL and OPRD 1989, Dahl 1990). Areas near lakes, rivers, and streams have historically been among the most intensively developed, for easy access to water. Coastal rivers and estuaries have been highly altered by humans; they have been drained, had their natural hydrologic processes such as tides and flows altered, and have been generally reduced in complexity. Streams and rivers have also been degraded by timber clearing practices (OPB 2000).

Construction of the pipeline and associated facilities would affect 962 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 13). The only location where the American white pelican has been observed within these watersheds is at Fish Lake; as they are not known to breed at this site, impacts to breeding individuals are not expected.

Mitigation actions proposed for federal lands that affect resources used by the American white pelican include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on federal lands would affect 1,100 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 13). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the American white pelican, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore

shade over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the American white pelican. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within watersheds where the proposed action crosses the cumulative effects analysis area include a variety of timber, fuel, grazing, road maintenance and weed treatment projects (Table 12). They would affect 3,782 acres, or 1.1 percent of the watersheds. These projects would not likely have additional harmful or beneficial impacts to American white pelican. Additionally, federal laws protect streams, rivers, and wetlands, and land use designations such as Riparian Reserves, and associated management practices on Forest Service land would likely increase the amount and integrity of these habitats used by American white pelicans over time.

The proposed Project, including mitigation actions, would affect approximately 2,062 acres. Combined with 3,782 acres overlapping reasonably foreseeable activities, approximately 5,844 acres within the cumulative effects analysis area would be affected, or 1.7 percent of the total watershed area (Table 13). The proposed action as well as the actions described above would not result in fluctuating water levels or disturbance at nest sites, which have been identified as threats to the American white pelican. Therefore, cumulative impacts on the American white pelican are expected to be insignificant because the combined impacts to the 1.7 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize any potential Project-related impacts are described in the Hydrostatic Test Plan (Appendix U of the BA) and the Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA). For a full description of CMP activities that would benefit the species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the American white pelican are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for American white pelican because breeding areas would be avoided by at least 8 miles, and other areas that could experience disturbance from Project construction represent about 0.1 percent of habitat available in the analysis area. Additionally, the Project should not contribute to known threats to American white pelican, such as fluctuating water levels.

6.2.2.4 *Harlequin duck (Histrionicus histrionicus)*

Species Status in the Project Area

In the west, harlequin duck breeding occurs in Alaska, Yukon, western Northwest Territories, British Columbia, western Washington, Idaho, western Montana, and northwestern Wyoming. Wintering areas are from the Aleutians along the coast down to northern California (Robertson and Goudie 1999). In Oregon, they are found in the Willamette River basin and along the coast during winter. As shown in Table 1, the species has been documented in the Umpqua and Rogue River national forests; it has not been documented and is not suspected to occur in the Winema National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the Harlequin duck within 5 miles of the Project on Forest Service lands (Forest Service 2006, ORBIC 2012). No harlequin ducks have been recorded on BBS routes within 50 miles of the Project in BCR 5 or BCR 9 during the past 20 years (Sauer et al. 2014).

Habitat for the harlequin duck is unique among ducks. They can be found along turbulent, fast-flowing rivers and streams during the breeding season, and shallow intertidal zones of rocky coastlines during winter (Table 20; Robertson and Goudie 1999, Johnson and O'Neil 2001). In the west Cascades, they are most often associated with fast-moving, unbraided, low to moderate (1–7 percent) gradient, third- to fifth-order streams in western hemlock forests (Dowlan 2003). Rocky streams are preferred, as in-stream rocks can be used as resting sites. Eggs are laid in scrapes on the ground under stumps, logs, or cliff ledges, lined with needles, mosses, and down. Nests are built from mid-April to early June, and eggs hatch from late May to late June (Dowlan 2003). Winter habitat is along rocky headlands, offshore rocks, jetties, and occasionally sandy beaches on the coast. Their diet is varied, and consists of amphipods, snails, small crabs, barnacles, and fish eggs (Robertson and Goudie 1999).

Although it has a wide global distribution, this species has experienced declines over most of its range, including substantial declines in the Pacific population. Harlequin ducks may be vulnerable to local extirpations due to high breeding and wintering site fidelity and small local breeding populations (NatureServe 2013). Hunting has historically been a factor decreasing populations, though harvest rates are currently low. Several environmental toxins affect this species, including creosote leaking from piers, diesel soot, oil spills, and bioaccumulating heavy metals (Robertson and Goudie 1999). Timber clearing activities degrade harlequin duck habitat by altering suitable riparian habitat, disrupting stream flow, and increasing silt loads (Robertson and Goudie 1999). Because of their low population numbers, statistically reliable population trends are difficult to calculate, but the population trend in Oregon appears stable to increasing (Wiggins 2005).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable harlequin duck habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 20 shows the habitat types within

the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 20. Harlequin Duck Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.08	0.00	40	0.20%
Eastside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.50	0.09	76	0.78%
Bays and Estuaries	Generally Associated	Feeds	0.00	0.00	0	0.00%
Total			**0.58**	**0.09**	**115**	**0.58%**

1/ Totals taken from Table 6 for the Rogue River and Umpqua and national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River and Umpqua national forests in which the species has been documented to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands.

While harlequin ducks have been documented on the Rogue River and Umpqua forests, no locations have been documented within 5 miles of the Project. Given that harlequin ducks have high fidelity to breeding locations, we can assume that no breeding locations would be impacted by the Project. Of available non-breeding habitat within the analysis area, approximately 0.6 percent would be impacted by the Project.

Harlequin ducks could potentially be disturbed by Project construction if they were in the area of a stream or river crossing. Construction activities are estimated to last about 8 weeks at a given location and could occur at any time of the year. We assume that while birds may be disturbed, as these birds would not be associated with a nearby nest, they would be able to move away from the disturbance.

Project construction could negatively impact potential breeding habitat by altering suitable riparian habitat; however, this impact would be mitigated as described below.

Cumulative Effects

The harlequin duck cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua and Rogue River national forests (Table 13). Harlequin duck habitat in the cumulative effects analysis area has been degraded by development and alteration since European settlement began in the late 1700s. Development has concentrated around lakes, rivers, streams, and coasts and an estimated one-third of historical wetlands in

Oregon have been lost, largely due to draining for agricultural use (ODSL and OPRD 1989, Dahl 1990). Harlequin duck habitat is currently threatened by timber clearing activities which modify stream flow and riparian habitat and increase sediment. Within the last few decades, federal laws have been enacted that protect waters and wetlands. The NWFP identifies restoration and maintenance of Riparian Reserves as a goal on Forest Service land. Riparian Reserves include the hydrologic, geologic or ecological features within a watershed that affect stream processes. These protections and management practices would likely enhance the quantity and quality of nesting habitat available to harlequin ducks in the cumulative effects analysis area in the future.

Construction of the pipeline and associated facilities would affect 1,950 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). However, no areas of known harlequin duck use occur within these 5th field watersheds.

Mitigation actions proposed for federal lands that affect resources used by the harlequin duck include fish passage, road storm proofing, road decommissioning, in stream LWD placement, stream crossing repair, and riparian planting projects. Mitigation actions on federal lands would affect 7,337 acres within the cumulative effects analysis area, or 1.5 percent of the total watershed area (Table 13). Potential negative impacts include noise disturbance and the potential for increased sediment during implementation. However, these projects would overall benefit the harlequin duck, if present, through habitat improvements and a reduction in disturbance over the long term. Fish passage and riparian planting projects would reconnect aquatic habitats and restore riparian vegetation, which would reduce sediment and restore shade and riparian structure over time. Road storm proofing and decommissioning, and stream crossing repair projects would reduce future sediment inputs; road decommissioning would additionally reduce future noise disturbance by limiting human access. Placement of LWD in streams would add structural complexity to aquatic systems, trap fine sediments, and contribute to reductions in stream temperatures over time which would improve habitat quality for the harlequin duck. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). They would affect 12,956 acres, or 2.6 percent of the watersheds. The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that would benefit harlequin duck nesting habitat within the watershed.

The proposed Project, including mitigation actions, would affect approximately 9,287 acres. Combined with 12,956 acres overlapping reasonably foreseeable activities, approximately 22,243 acres within the cumulative effects analysis area would be affected, or 4.5 percent of the total watershed area (Table 13). The proposed action would contribute to effects from timber clearing activities that degrade harlequin duck habitat by altering suitable riparian habitat, disrupting stream flow, and increasing silt loads (Robertson and Goudie 1999); however, the mitigation actions proposed would offset these impacts as described above. The Project is not expected to contribute environmental toxins, which is also noted as a threat to this species

(Robertson and Goudie 1999). Additionally, neither the Project nor reasonably foreseeable Projects are expected to impact breeding harlequin ducks. Therefore, cumulative impacts on the harlequin duck are expected to be insignificant because the combined impacts to the 4.5 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Several projects within the Rogue River and Umpqua national forests would benefit the species and include the repair of over 30 stream crossings, riparian plantings and in-stream placement of woody debris that would provide nesting cover and improve stream integrity. For a full description of CMP activities that would benefit the species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the harlequin duck are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Harlequin duck because no known breeding areas would be impacted, and other areas that could experience disturbance from Project construction represent 0.6 percent of habitat available in the analysis area.

6.2.2.5 *Bufflehead (Bucephala albeola)*

Species Status in the Project Area

The breeding range for buffleheads is interior Alaska, southern Northwest Territories, northeast and southern British Columbia, northern Alberta and Saskatchewan, and at scattered, isolated locations in Washington, Oregon, California, Idaho, Montana, and Wyoming. The highest breeding densities recorded are in central British Columbia (Gauthier 1993). During the nonbreeding season, buffleheads range from southern Alaska, down the Pacific coast, and throughout most of the continental U.S. In Oregon, they are found at scattered locations throughout the state, and they could potentially be found along most of the proposed pipeline route (Scheuering 2003). Breeding is recorded in the central and south Cascades, including in

Klamath County (Scheuering 2003). As shown in Table 1, the species has been documented in Umpqua and Rogue River national forests; it has not been documented and is not suspected to occur in the Winema National Forest. The bufflehead has been observed multiple times within 1-5 miles of the Project centerline in the Rogue River National Forest near Fish Lake; it has not been documented within 5 miles of the Project in the Umpqua or Winema national forests (Forest Service 2006, ORBIC 2012, Colyer 2014). No buffleheads have been recorded on BBS routes within 50 miles of the Project in BCR 5 during the past 20 years but an average of 2 per year were recorded on routes in BCR 9 during the past 20 years (Sauer et al. 2014).

The species breeds at high-elevation forested lakes, with nests built in cavities or artificial nests boxes in trees next to water (Table 21; Johnson and O'Neil 2001, Scheuering 2003). During migration and winter, buffleheads use small freshwater lakes and ponds with little or no vegetation, sewage treatment ponds, and slow-moving rivers. Food habits consist of diving for aquatic invertebrates such as insects, crustaceans, and mollusks, and seeds (Gauthier 1993).

Numbers of buffleheads had decreased by 1930 due to overshooting. Once the species gained protection under the Migratory Bird Treaty Act, its numbers began to increase. However, human disturbance from recreation and a decrease in suitable nesting cavities due to forestry practices are believed to be contributing to its continued low population numbers in Oregon, which show a decline of 7 percent annually between 2001 and 2011 (Scheuering 2003, Sauer et al. 2012).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable bufflehead habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 21 shows the habitat types within the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 21. Bufflehead Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Herbaceous Wetlands	Closely Associated	Feeds	0.00	0.00	28	0.01%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.39	0.00	152	0.26%
Bays and Estuaries	Closely Associated	Feeds	0.00	0.00	0	0.00%
Total			**0.40**	**0.00**	**180**	**0.22%**

1/ Totals taken from Table 6 for the Winema and Umpqua national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Winema and Umpqua national forests in which the species has been documented to occur; does not include habitat located in the Rogue River National Forest or on other federal or non-federal lands.

While bufflehead have been documented on the Rogue River and Umpqua national forests, no locations have been documented within 1 mile of the Project centerline. On the Rogue River National Forest, this species has been documented multiple times near Fish Lake, which occurs about 2 miles from the Project centerline, but is also a proposed hydrostatic test water source. Based on the lack of documented occurrences and lack of ideal high-mountain lake habitat being impacted, we assume that no breeding locations would be impacted by the Project. Of available non-breeding habitat within the analysis area, approximately 0.2 percent would be impacted by the Project.

Bufflehead could potentially be disturbed by Project construction if they were in the area of a stream or river crossing during construction. Construction activities are estimated to last about 8 weeks at a given location and could occur at any time of the year. We assume that while birds may be disturbed, as these birds would not be associated with a nearby nest, they would be able to move away from the disturbance.

Project construction could negatively impact potential breeding habitat by removing snags. In the analysis area, approximately 1.79 percent of snags estimated to be present would be impacted by the Project (Appendix D).

Cumulative Effects

The bufflehead cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua and Rogue River national forests (Table 13). Potential bufflehead habitat in this analysis area has been degraded by development and alteration since European settlement began in the late 1700s. Human development has a pattern to concentrate around lakes, rivers, streams, and coasts. An estimated one-third of historical wetlands in Oregon have been lost, largely due to draining for agricultural use (ODSL and OPRD 1989, Dahl 1990). Streams and rivers have been degraded by timber clearing practices, hydrologic processes such as tides and floods have been altered, and the complexity of aquatic habitats in Oregon has generally been reduced (OPB 2000). However, within the last few decades, federal laws have been enacted that protect waters and wetlands. The NWFP identifies restoration and maintenance of Riparian Reserves as a goal on Forest Service land. Riparian Reserves include the hydrologic, geologic or ecological features within a watershed that affect stream processes. These protections and management practices should enhance the quantity and quality of habitat available to buffleheads in the analysis area in the future.

Construction of the pipeline and associated facilities would affect 1,950 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). No known breeding areas have been identified within these 5th field watersheds. Project effects would primarily be from disturbance during construction, removal of non-breeding habitat, and removal of potential breeding habitat through snag removal. However, disturbance during construction would be short-term, lasting approximately 8 weeks at any given location. Removal of non-breeding habitat would be minimal, as only approximately 0.4 percent of the cumulative effects analysis area would be affected. Additionally, snags removed during construction would be replaced through approximately 331 acres of snag creation on the Umpqua National Forest.

Other mitigation actions proposed for federal lands that would benefit buffleheads include aquatic restoration and riparian planting projects, as well as road decommissioning projects. The restoration projects would improve potential nesting habitat, and the road decommissioning projects would result in decreased disturbance long-term. Mitigation actions on federal lands would affect 7,337 acres within the cumulative effects analysis area, or 1.5 percent of the total watershed area (Table 13). These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects on the Umpqua and Rogue River national forests include projects within the Elk Creek, Upper Cow Creek, Trail Creek, and Little Butte Creek watersheds (Table 12). The aquatic restoration projects include in-stream restoration activities that benefit water quality, bank stability and road decommissioning actions that would benefit bufflehead nesting habitat within the watershed. Livestock grazing within the Fish Lake Allotment are unlikely to degrade bufflehead habitat.

The proposed Project, including mitigation actions, would affect approximately 9,287 acres. Combined with 12,956 acres overlapping reasonably foreseeable activities, approximately 22,243 acres within the cumulative effects analysis area would be affected, or 4.5 percent of the total watershed area (Table 13). The proposed action could contribute to a decrease in suitable nesting cavities similar to the forestry practices that currently threaten this species. However, no known nest sites would be impacted by the Project, and snag creation would increase suitable nest sites. The Project could also increase human disturbance similar to the effects of recreation that are believed to be contributing to its continued low population numbers in Oregon. However, disturbance from construction would be short-term, and would be mitigated through road decommissioning. Additionally, neither the Project nor reasonably foreseeable Projects are expected to impact breeding buffleheads. Therefore, cumulative impacts on the bufflehead are expected to be insignificant because the combined impacts to the 4.5 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Several projects within the Rogue River and Umpqua national forests would benefit the species and include the repair of stream crossings, riparian plantings and in-stream placement of woody debris that would provide nesting cover and improve stream integrity. For a full description of CMP activities that would

benefit the species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the bufflehead are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for bufflehead because no breeding locations would be impacted by the Project, and of available non-breeding habitat within the analysis area, approximately 0.2 percent would be impacted by the Project.

6.2.2.6 *Upland sandpiper (Bartramia longicauda)*

Species Status in the Project Area

The upland sandpiper breeds within a contiguous area in the Great Plains and Great Lakes regions of the U.S. and Canada, as well as some locations in Alaska, the Yukon Territory, and a small relict population in Oregon and Idaho. Upland sandpipers winter in South America (Houston and Bowen 2001). This species has been documented in Klamath County, and is a rare breeder in large montane meadows within forests of eastern Oregon. Upland sandpipers are almost never observed away from the breeding grounds in Oregon (Marshall et al. 2006). As shown in Table 1, the species has been documented in the Winema National Forest; it has not been documented and is not suspected to occur in the Rogue River nor the Umpqua National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the upland sandpiper within 5 miles of the Project on NFS lands (Forest Service 2006, ORBIC 2012). No upland sandpipers have been recorded on BBS routes within 50 miles of the Project in BCR 5 or BCR 9 during the past 20 years (Sauer et al. 2014).

The upland sandpiper is an obligate grassland species often found in native prairie (Vickery et al. 1999). In Oregon, this sandpiper is found in large montane meadows at 3,400-5,060 feet elevation, generally surrounded by lodgepole and sometimes ponderosa pine forest. Upland sandpipers mostly eat small invertebrates, especially insects, but a small percentage of their diet consists of weed seeds (Houston and Bowen 2001, Stern 2003). Foraging habitat consists of vegetation shorter than 2.5 inches (Stern 2003). Nesting takes place in 6 to 12-inch tall vegetation that provides concealment cover (Kirsch and Higgins 1976). In Oregon, birds appear on breeding grounds during the first week of May, egg-laying occurs from mid-May until mid-June, and fledging takes place from mid-July until mid-August.

Initial declines in upland sandpiper populations were caused by hunting in the late 1800s. The species' continued decline has been linked to conversion of prairie habitat to agriculture and rangeland, encroachment of pine onto meadows, and the use of herbicides that reduce forb cover in nesting habitats (Stern 2003). Because of their low population numbers, statistically reliable population trends are difficult to calculate, but the population trend in the western breeding bird survey region appears stable (Sauer et al. 2012).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes suitable habitat within 3,200 feet of the proposed action within the Winema National Forest. Table 22 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 22. Upland Sandpiper Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Eastside Grasslands	Closely Associated	Feeds and Breeds	0.91	0.00	2 [3/]	46.48% [3/]
Herbaceous Wetlands	Generally Associated	Feeds and Breeds	0.00	0.00	27	0.00%
Total			**0.91**	**0.00**	**29**	**3.12%**

1/ Totals taken from Table 6 for the Winema National Forest in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Winema national forests in which the species has been documented to occur; does not include habitat located in the Rogue River and Umpqua national forests or on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

While this table represents impacts to general habitats that the upland sandpiper may use that would be impacted by the Project, areas of known use by upland sandpiper would not be impacted by the Project. Specifically, the closest known breeding location, Sycan Marsh, is approximately 50 miles from the Project. Additionally, ODFW maps the closest potential habitat for the upland sandpiper approximately 40 miles northeast of the Project, in the vicinity of Sycan Marsh (INR 2011).

If upland sandpipers were to occur near the Project, we assume that they would be non-breeders, and they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, because upland sandpipers are a mobile species, they should be able to move away from Project construction activities.

Cumulative Effects

Native grasslands are one of the most imperiled habitats in the western U.S., including Oregon, due to conversion to agriculture, development, invasion by non-native plant species, and fire suppression (Vickery et al. 1999). In the Coast Range and West Cascades of Oregon, grassland loss since historical times is estimated at 99 percent (ODFW 2006). Sustainable grazing practices help maintain existing grasslands. Allotment management plans within national forests control the number of cattle and available forage, thus minimizing the degradation of suitable upland sandpiper habitat.

The upland sandpiper cumulative effects analysis area includes the only fifth field watershed crossed by the Project on the Winema National Forests: Spencer Creek (Table 13). Overall, construction of the project and associated facilities would affect 231 acres within the Spencer Creek watershed, or 0.4 percent of the watershed. Other than these minor potential habitat effects, potential impacts to upland sandpipers are expected to be limited to disturbance of nonbreeding individuals as no known breeding sites have been documented within 5 miles of the Project. No mitigation projects that would benefit upland sandpiper habitat on the Winema National Forest directly, although restoration of grassland areas following construction could benefit the upland sandpiper through habitat creation and/or restoration if the species is present.

Livestock grazing on the Winema National Forest (Table 12) could further degrade potential upland sandpiper habitat; however, given the very limited range of the upland sandpiper in Oregon at this time, this would likely be a minimal impact. Additionally, sustainable grazing practices can actually help maintain grasslands by limiting forest succession of meadow habitats. The Project would not contribute to the conversion of prairie habitat to agriculture and rangeland, encroachment of pine onto meadows, or the use of herbicides that reduce forb cover in nesting habitats which currently threaten this species (Stern 2003). Therefore, cumulative impacts on the upland sandpiper are expected to be insignificant.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize any potential Project-related impacts include the use of native grass mixes during site restoration and habitat enhancements. These measures and other conservation measures are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). The Blasting and Helicopter Noise Analysis and Mitigation Plan identifies measures to minimize noise disturbance if the species was present (Appendix P of the BA).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for upland sandpiper because of the low likelihood of encountering this species as the nearest breeding location is approximately 50 miles from the Project and this species is rarely documented outside of those areas in Oregon (Marshall et al. 2006).

6.2.2.7 *Bald eagle (Haliaeetus leucocephalus)*

Species Status in the Project Area

Bald eagles occur throughout the state and nest in 32 of 36 Oregon counties including the countries crossed by the Project. As shown in Table 1, the species has been documented in all three national forests crossed by the Project. The bald eagle has been observed twice within 1-5 miles of the Project in the Rogue River National Forest and four times within 1-5 miles of the

Project on the Wimena National Forest (Forest Service 2006, ORBIC 2012). No observations of the bald eagle have been documented within 5 miles of the Project in the Umpqua National Forest. On NFS lands, two bald eagle nests have been documented in the vicinity of the Project, both on the Winema National Forest near Fish lake; both are more than one mile away from the Project centerline.

Bald eagles primarily nest in forested areas near the ocean, along rivers, and at estuaries, lakes, and reservoirs (Table 23; Johnson and O'Neil 2001). Consequently, shoreline is an important component of nesting habitat; 84 percent of Oregon nests were within 1 mile of water (Isaacs and Anthony 2001). Nest building and repair occur any time of year, but are most often observed from February-June (Isaacs and Anthony 2001). The usual clutch size is two. Eggs are incubated by both parents for 35-46 days. Young are usually flying at about 3 months of age (Csuti et al. 2001). Eagles consume a variety of prey that varies by location and season. Fish, carrion, birds, and mammals are among the most common prey.

Although delisted, the bald eagle remains protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) that prohibits "take" of bald and golden eagles, which includes disturbance. Oregon has over 550 breeding pairs which ranks seventh highest in the continental U.S. (Isaacs and Anthony 2011). In Oregon, populations have increased 6.6 percent annually between 2002 and 2011 (Sauer et al. 2012). Of the current threats to the bald eagle, removal of trees used for nesting or roosting or disturbance related-impacts during construction are relevant to the Project. Contaminants have been implicated in reduced productivity of nesting pairs on the Columbia River downstream of Portland (Anthony et al. 1993, Buck 1999). BBS data (Sauer et al. 2014) indicate significant increasing trends for bald eagle populations in BCR 5 and BCR 9.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable bald eagle habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 23 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 23. Bald Eagle Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowlands Conifer-Hardwood Forest	Generally Associated	Reproduces	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	Generally Associated	Reproduces	80.63	26.39	833	12.84%

Table 23. Bald Eagle Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Reproduces	312.20	93.17	11,980	3.38%
Ponderosa Pine Forest and Woodlands	Generally Associated	Reproduces	0.01	0.00	958	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	Generally Associated	Reproduces	0.00	0.00	0	0.00%
Herbaceous Wetlands	Generally Associated	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.08	0.00	40	0.20%
Eastside Riparian-Wetlands	Generally Associated	Feeds and Breeds	0.28	0.00	224	0.13%
Agriculture, Pastures and Mixed Environs	Generally Associated	Feeds	0.00	0.00	0	0.00%
Developed-Urban and Mixed Environs	Generally Associated	Feeds and Breeds	27.72	0.00	28	98.98%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.53	0.09	207	0.30%
Bays and Estuaries	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**421.45**	**119.65**	**14,298**	**3.78%**

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

This table represents impacts to general habitats that bald eagles may use that would be impacted by the Project; however, areas of known use by bald eagles would not be impacted by the Project. Specifically, the closest known bald eagle nests on NFS lands is at Fish Lake, approximately 2 miles from the Project. Of potential habitat within the analysis area, about 4 percent would be impacted by the Project. While some inactive or potential nest trees could be removed, this represents a small portion of available habitat within the analysis area.

Aerial surveys for bald eagles would be conducted within 0.5-miles of the ROW and other areas subject to ground disturbances during spring prior to timber clearing or pipeline construction. Any occupied nests observed would be subject to spatial and temporal buffers; no surface disturbance would be performed within 0.25 mile of an occupied bald eagle nest from January 1 to August 31 (JCEP and PCGP 2015).

If nonbreeding bald eagles were to occur near the Project, they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, they should be able to move away from Project construction activities to nearby suitable habitat.

Cumulative Effects

The bald eagle cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 13). Threats to bald eagles include habitat loss and human disturbance. The proposed Project could contribute to these threats, although disturbance to breeding individuals and removal of known nest sites are not anticipated. Two nests have been documented at Fish Lake, which is a proposed hydrostatic test water source. However, hydrostatic testing is projected to occur in the late summer to early fall immediately following pipeline construction. In Oregon, eagles typically begin nest building in January, and young typically fledge from June through August (FWS 2007). Therefore, activity during water withdrawal at Fish Lake is not expected to disturb breeding bald eagles.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Approximately 476 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands). Removal of potential nest sites could occur, although no known sites have been documented within the Project ROW. Additionally, any potential nest sites removed during construction would be replaced through 1,029 acres of snag creation.

Mitigation actions proposed for federal lands that affect resources used by the bald eagle include road closure, fuels reduction, fire suppression, reallocation of matrix to LSR, riparian vegetation planting, and snag creation projects. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). Potential negative impacts include disturbance during implementation of these projects, such as during fuels reduction projects. However, these projects would overall benefit bald eagles through habitat improvements and a reduction in disturbance over the long term. Road closures would reduce disturbance to individuals if present; fuels reduction and fire suppression projects would result in a reduction of potential habitat loss through fire; and planting of riparian vegetation would improve habitat quality for bald eagles at these sites. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). Projects could potentially remove potential nesting habitat, although this would be unlikely as any silvicultural treatments conducted by the Forest Service would likely leave any large trees that eagles would potentially use. Projects on NFS lands would comply with the Bald and Golden Eagle Protection Act which would include avoiding disturbance of breeding birds.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres overlapping reasonably foreseeable activities, approximately 22,941 acres within the cumulative effects analysis area would be affected, or 4.2 percent of the total watershed area (Table 13). The proposed action as well as the actions described above could contribute to habitat loss and human disturbance which have been identified as threats to bald eagles. However, these effects would be avoided, minimized and otherwise mitigated as described above. Additionally, only approximately 4.2 percent of the cumulative effects analysis area would be affected by the proposed Project and other planned projects. Therefore, cumulative impacts on the bald eagle are expected to be insignificant.

Conservation Measures and Mitigation

Pacific Connector would avoid known nests, thereby eliminating potential impact. Specific conservation measures that would help minimize Project-related impacts are identified in the Blasting and Helicopter Noise Analysis and Mitigation Plan identifies measures to minimize noise disturbance (Appendix P of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Several projects within the Rogue River, Winema and Umpqua national forests would benefit the species and include the repair of over 30 stream crossings. For a full description of CMP activities that would benefit the species see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit bald eagles are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for bald eagle because of its increasing population and because of the low likelihood of encountering this species as known nests will be avoided and about 4 percent of potential habitat in the analysis area would be impacted by the Project.

6.2.2.8 *American peregrine falcon (Falco peregrinus anatum)*

Species Status in the Project Area

Peregrine falcons breed on every continent except Antarctica (Henny and Pagel 2003). Distribution is increasing rapidly, and in North America the American peregrine falcon is found locally across most of the continent (White et al. 2002). In Oregon, species presence has been confirmed in the southern Cascade Mountains, the Coast Range in southwest Oregon, and in the Wallowa Mountains in the northeast corner of the state (Henny and Pagel 2003). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. The peregrine falcon has been observed once within 1 mile of the Project in the Umpqua National Forest; there have been no documented observations of the peregrine falcon

within 5 miles of the Project in the Winema or Rogue River national forests (Forest Service 2006, ORBIC 2012). A peregrine falcon eyrie on the Umpqua National Forest within the vicinity of the proposed action has been active for several years. The eyrie is approximately 0.2 mile southwest of MP 112.32 (T32S, R2W, Section 35).

Global use of pesticides, especially DDT, from the late 1940s to early 1970s, reduced eggshell thickness among peregrine falcons, causing massive population declines. With the ban of DDT in 1972 in the United States and federal protection of remnant populations under the ESA, the peregrine falcon population began increasing in the late 1970s. The American peregrine falcon was de-listed in 1999 (64 FR 46541).

Habitat preferences for this species are very diverse. They use or pass through all terrestrial ecosystems and nearby waters, making generalizations about habitat use difficult. The species is generally associated with woodlands, grassland and aquatic systems (Table 24; Johnson and O'Neil 2001, Henny and Pagel 2003). In some circumstances, individuals have adapted well to urban environments, using buildings and bridges as nest structures and preying on feral pigeons. A common feature of nesting habitat is cliffs, although peregrines also use nests constructed by other raptor species (Henny and Pagel 2003). Prey species are also extremely diverse, and include birds, mammals, reptiles, insects, and fish, and ranging in size from mayflies to mountain beavers (Henny and Pagel 2003).

In 1998, there were at least 3,400 breeding American peregrine falcon individuals range wide, and their short-term trend indicates that the global population as stable to increasing (NatureServe 2013). Primary threats to American peregrine falcons are habitat loss, human disturbance, illegal take, and environmental contaminants (NatureServe 2013). Although DDT, the pesticide responsible for the initial decline in American peregrine falcon populations in the 1940s, has been outlawed in the U.S. since 1972, eggshell thickness of this species is still affected by environmental contaminants (Steidl et al. 1991, Court 1993), which is possibly due to the pesticide's continued use in Latin America where the birds winter (NatureServe 2013). BBS data (Sauer et al. 2014) indicate significant increasing trends for peregrine falcon populations in BCR 5 and BCR 9.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable American peregrine falcon habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 24 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 24. American Peregrine Falcon Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Westside Lowlands Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	Generally Associated	Feeds and Breeds	80.63	26.39	833	12.84%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	312.20	93.17	11,980	3.38%
Ponderosa Pine Forest and Woodlands	Generally Associated	Feeds and Breeds	0.01	0.00	958	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Western Juniper and Mountain Mahogany Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Shrub-Steppe	Generally Associated	Feeds and Breeds	6.75	0.62	9	79.64%
Westside Grasslands	Generally Associated	Feeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Grasslands	Generally Associated	Feeds and Breeds	1.29	0.00	3 [3/]	50.41% [3/]
Herbaceous Wetlands	Generally Associated	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Generally Associated	Feeds	0.08	0.00	40	0.20%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.28	0.00	224	0.13%
Developed-Urban and Mixed Environs	Generally Associated	Feeds and Breeds	27.72	0.00	28	98.98%
Coastal Dunes and Beaches	Generally Associated	Feeds	1.54	0.00	2	77.00%
Open Water-Lakes, Rivers, and Streams	Generally Associated	Feeds	0.53	0.09	207	0.30%
Bays and Estuaries	Generally Associated	Feeds	0.00	0.00	0	0.00%
Total			**433.57**	**120.60**	**14,322**	**3.87%**

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

1

While this table represents impacts to general habitats that peregrine falcons may use that would be impacted by the Project, areas of known use would not be impacted by the Project. The only known active nest site in the vicinity of the Project is 0.2 miles southwest of the Project on the Umpqua National Forest. The Umpqua Forest Plan includes spatial and temporal restrictions to protect peregrine falcon eyries, and prohibits disturbances within 1.5 miles of active nest sites from January 1 through July 31. Consequently, Pacific Connector has indicated they would not perform timber clearing or construction activities between MP 111.10 and MP 113.43 between January 1 and July 31 to avoid impacts to nesting peregrine falcon.

If nonbreeding peregrine falcons were to occur near the Project, they could be disturbed by pipeline construction that could render habitats temporarily unsuitable. However, they should be able to move away from Project construction activities into nearby suitable habitat and not be directly affected.

Cumulative Effects

The American peregrine falcon cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 13). Two threats to peregrine falcons are habitat loss and human disturbance. The proposed Project could contribute to these threats, although disturbance to breeding individuals and removal of known nest sites are not anticipated as the known eyrie would be avoided as described above. Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Approximately 476 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands).

Planned projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 12). Forest Service projects are not expected to have additional impact to peregrine falcons because eyries would be avoided. Similarly, mitigation actions proposed for federal lands within the cumulative effects analysis area are not expected to affect peregrine falcons.

No potential cliff nesting habitat would be directly impacted. Additionally, the Project combined with planned projects in the cumulative effects analysis area would not contribute to illegal take or environmental contaminants which are threats to this species. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time. Therefore, cumulative impacts on the American peregrine falcon are expected to be insignificant.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize impacts to the peregrine falcon include seasonal restrictions to construction activities for helicopter use and blasting activities (see Appendix N and P of the BA). Pacific Connector has indicated they would avoid disturbances within 1.5 miles of active peregrine falcon nest sites from January 1 through July 31. As a result, they would not perform timber clearing or construction activities between MP

111.10 and MP 113.43 between January 1 and July 31 to avoid impacts to nesting peregrine falcons documented on the Umpqua National Forest.

Determination of Impact

In considering potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for American peregrine falcon because known eyries would be avoided, and only about 4 percent of potential habitat in the analysis area would be impacted by the Project.

6.2.2.9 *White-headed woodpecker (Picoides albolarvatus)*

Species Status in the Project Area

White-headed woodpeckers are found year-round in scattered areas of suitable mountainous coniferous forest from south-central British Columbia through the Cascades of Washington and Oregon, the Ochoco, Blue, and Wallowa mountains of northeastern Oregon, the Sierra Nevada and Lake Tahoe area, and scattered small locations in southern California, corresponding with the highest mountain ranges in the area. In Oregon, they are most commonly found east of the Cascades. As shown in Table 1, the species has been documented in all three national forests crossed by the Project. The white-headed woodpecker has been observed once within 1-5 miles of the Project in the Wimena National Forest; there are no documented observations of the species within 5 miles of the Project in the Rogue River or the Umpqua national forests (Forest Service 2006, ORBIC 2012). Partners in Flight Science Committee (2013) estimates 4,000 white-headed woodpeckers in BCR 5 and 36,000 in BCR 9.

Open ponderosa pine or mixed-conifer forests dominated by ponderosa pine are the main habitats used by white-headed woodpeckers (Bull et al. 1986, Johnson and O'Neil 2001). They forage among the cones and bark of live ponderosa pines, looking for insects and seeds, with trees greater than 10 inches dbh preferred (Bull et al. 1986, Marshall 2003). Main foods taken are invertebrates, especially ants and beetles, and conifer seeds; the relative importance of these two diet components varies seasonally (Garrett et al. 1996). Nesting is in cavities excavated in snags, down trees, or logs at an average height of 8 feet (Garrett et al. 1996). Cavities excavated by other species are sometimes used (Marshall 2003). Nest excavation takes place in May, with eggs laid late May into the first half of June. Incubation is 14 days.

The major threat to this species is loss of habitat. Less than 10 percent of old-growth ponderosa pine in Oregon and Washington remains from the time of pre-European settlement, and much of what is left is too fragmented to be suitable for white-headed woodpeckers (Marshall 2003). Fire suppression has precluded natural forest thinning, including grass reduction by grazing which inhibits a fire's ability to spread; this leads eventually to the replacement of pines with firs. The resultant increase in shrubby understory resulting from fire suppression may also increase mammalian nest predation on white-headed woodpeckers (Marshall 2003). Timber harvest on federal lands, which historically targeted large-diameter trees, also has contributed to the degradation of white-headed woodpecker habitat.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable white-headed woodpecker habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 25 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 25. White-headed Woodpecker Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Ponderosa Pine Forests and Woodlands	Closely Associated	Feeds and Breeds	0.01	0.00	958	0.00%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.08	0.00	40	0.20%
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.28	0.00	224	0.13%
Total			**0.37**	**0.00**	**1,221**	**0.03%**

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

Of the ponderosa pine habitat that would be impacted within the analysis area, the 0.01 acres are identified as clearcut/regenerating (Table 6) and would thus not meet the criteria for suitable habitat for white-headed woodpecker. While some riparian habitat within the analysis area would be impacted by the Project, this acreage represents a small percentage (0.14 percent) of available riparian habitat. The minimal amount of habitat impacted coupled with the single documented occurrence within 5 miles of the Project make impacts to this species from Project construction unlikely.

If an individual were passing through the area, it could be disturbed by Project construction. However, individuals would be able to move away from disturbance into nearby suitable habitat. Project construction would last about 8 weeks at any given location and could occur at any time of the year.

Cumulative Effects

The white-headed woodpecker cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 13). While ponderosa pines are still common, the key characteristics of historical open ponderosa pine woodlands have changed dramatically, mostly due to timber clearing and fire suppression (ODFW 2006). Only an estimated seven percent of historically-structured

ponderosa pine forests remain in the Klamath Mountains province, most of which are greatly reduced in patch size and connectivity (ODFW 2006). The primary threat to this species is habitat loss. Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13); however, only 0.01 acres are ponderosa pine-dominated, so Project effects are expected to be minimal.

Mitigation actions proposed for federal lands that could affect resources used by the white-headed woodpecker include fuels reduction, fire suppression, reallocation of matrix to LSR, riparian vegetation planting, snag creation, and LWD upland placement projects. Potential negative impacts of these mitigation actions include succession to fir-dominated forests from fire suppression, and loss of forage habitat if live ponderosa pines are converted to snags. However, fire suppression would reduce habitat loss from stand-replacing fires, and snag creation as well as upland LWD placement could result in an increase in available nesting cavities. Fuels reduction projects would clear understory vegetation historically cleared by low-intensity understory fires, and potentially reduce mammalian nest predation. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 12). Timber sales and clearcutting on NFS lands could affect this species by removing habitat and disturbing birds year-round, although disturbance is not listed as a threat to this species (Marshall 2003). Anticipated timber clearing on private lands could also result in habitat loss. The pre-commercial thinning in the national forests would most likely contribute to the long term health of the forest ecosystems, and could benefit the white-headed woodpecker if the projects were located in ponderosa pine forest. Under the NWFP, LSRs and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres overlapping reasonably foreseeable activities, approximately 22,941 acres within the cumulative effects analysis area would be affected, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with the actions described above would contribute to habitat loss which is listed as the primary threat to this species (Marshall 2003). However, suitable habitat removed by the Project is expected to be minimal, and the proposed mitigation actions would compensate for this loss. Construction noise disturbance to potential habitat in the analysis area would be of short duration, lasting about 8 weeks in any location. Therefore, cumulative impacts on the white-headed woodpecker expected to be insignificant because the combined impacts to the 4.2 percent of the watershed area, including short-term disturbance effects, are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Pacific Connector would remove timber outside of the core migratory bird breeding season (April 1 -July 15), thus avoiding removal of occupied white-headed woodpecker nest sites if present. Noise disturbance from blasting and helicopter activity would be minimized with use of blast mats or other devices. For a full description of CMP activities that would benefit this bird species see Appendix O of the BA.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for white-headed woodpecker because of the limited amount of suitable habitat the Project would affect (0.03 percent of habitat available within the analysis area), and the mobility of the species to escape disturbance.

6.2.2.10 *Lewis's woodpecker (Melanerpes lewis)*

Species Status in the Project Area

The Lewis's woodpecker is found in mountainous areas of the western U.S. During winter, they shift to the southern portion of their range. In Oregon, they are found in most parts of the state, especially the Cascade, Wallowa, and Blue mountains. Along the potential pipeline route, they have been documented in Coos, Douglas, Jackson, and Klamath Counties. As shown in Table 1, the species has been documented in all three national forests crossed by the Project. Neither the Forest Service nor ORBIC location database records contained observations of the Lewis's woodpecker within 5 miles of the Project on Forest Service lands (Forest Service 2006, ORBIC 2012). However, there is one record of a Lewis's woodpecker documented 1.1 miles from the ROW on private land (ORBIC 2012). BBS data within 50 miles of the Project in BCR 9 indicate Lewis' woodpeckers have been increasing locally. Note that Partners in Flight Science Committee (2013) estimates 30,000 Lewis' woodpeckers in BCR 9.

Breeding habitat for Lewis's woodpecker is predominantly open Douglas-fir or oak forests, open riparian woodland dominated by cottonwood, and logged or burned pine forest (Table 26; Johnson and O'Neil 2001). Important characteristics are an open canopy, a brushy understory, dead and LWD material, perches, and abundant insects (Tobalske 1997). Nests are in tree cavities, and soft dead or dying trees are required (Vierling 1997). Species used vary and in Oregon include Oregon white oak (*Quercus garryana*), ponderosa pine, cottonwoods, and juniper (Galen 2003, Thomas et al. 1979). Eggs are laid in May and June, and incubation lasts 12 to 16 days (Tobalske 1997). Lewis's woodpeckers are opportunistic feeders, consuming largely insects during the spring and summer, and acorns and ripe fruits during fall and winter (Galen 2003). Typical winter habitat is oak woodlands and commercial orchards, and birds depend on acorn crops during this time of year (Vierling 1997).

In Oregon, the species was once considered abundant but populations have declined 0.5 percent annually between 2001 and 2011 (Sauer et al. 2012). Lewis's woodpeckers are

declining throughout their range, probably due to loss of suitable lowland oak habitat and loss of snags for nesting; only 2 to 8 percent of open ponderosa pine stands remain in eastern Oregon compared to presettlement conditions (Tobalske 1997). Another factor contributing to habitat degradation is timber clearing practices and fire suppression which result in denser forest types (Tobalske 1997). Other factors are competition for nest holes with European starlings (*Sterna vulgaris*) and pesticide application.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Lewis's woodpecker habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 26 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 26. Lewis' Woodpecker Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	312.20	93.17	11,980	3.38%
Ponderosa Pine Forests and Woodlands	Generally Associated	Feeds and Breeds	0.01	0.00	958	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	Closely Associated	Feeds	0.00	0.00	0	0.00%
Westside Grasslands	Generally Associated	Feeds and Breeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.28	0.00	224	0.13%
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**315.03**	**93.50**	**13,172**	3.10%

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Of potential habitat available within the analysis area, 3.1 percent would be impacted by the Project; 1.79 percent of snags present within the analysis area would be impacted by the

Project (Appendix D). Project construction could potentially disturb breeding birds. During construction, adults would be able to temporarily relocate in order to avoid direct impacts, but incubating adults could be induced to abandon an active nest, leaving eggs or chicks vulnerable to predation and the elements. Chicks could also be killed directly if the tree or snag containing their nest is felled while occupied. However, because Lewis's woodpecker is most closely associated with westside oak woodlands, and this habitat does not exist in the area impacted by the Project, direct impacts are expected to be minimal (Table 6). An indirect effect of Project activities could be disturbance to wintering birds, possibly lowering their fitness at a colder time of year. ROW clearing and pipeline construction could also modify habitat, for example by removing snags, altering tree species composition in forests, and changing the seral stage of the habitat.

Project impacts would contribute to existing threats by removing snags (albeit not in the most suitable breeding habitat for Lewis's woodpecker), and using some pesticide application. However, pesticide application will be limited, and would be used in accordance with Pacific Connector's Integrated Pest Management Plan that was developed in coordination with the Forest Service.

Cumulative Effects

The Lewis' woodpecker cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 13). While ponderosa pines are still common, the key characteristics of historical open ponderosa pine woodlands have changed dramatically, mostly due to timber clearing and fire suppression (ODFW 2006). Only an estimated seven percent of historically-structured ponderosa pine forests remain in the Klamath Mountains province, most of which are greatly reduced in patch size and connectivity (ODFW 2006).

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Approximately 476 acres disturbed during pipeline construction would be revegetated following construction, and be allowed to return to its pre-construction condition outside of the 30-foot maintenance corridor (excluding Matrix lands), 86 percent of which is currently forested. The Project would contribute to the habitat loss and modification that has caused Lewis' woodpecker numbers to decline, and could also disturb breeding individuals if present. However, as described above, these impacts would be minimal because very little oak and pine habitat would be impacted by the Project.

Mitigation actions proposed for federal lands that could affect resources used by the Lewis' woodpecker include fuels reduction, fire suppression, reallocation of matrix to LSR, riparian vegetation planting, snag creation, and LWD upland placement projects. Potential negative impacts of these mitigation actions include forest succession from fire suppression that results in a more full overstory less suitable to Lewis' woodpecker, and fuels reduction projects that would clear the thick understory required by Lewis' woodpeckers. However, both fire suppression and fuels reduction projects would also reduce habitat loss from stand-replacing

fires. Snag creation as well as upland LWD placement could result in an increase in available nesting cavities. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). These proposed mitigation projects are described in detail in Appendix F of the FESI for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). The pre-commercial thinning projects in the national forests would most likely contribute to the long-term health of the forest ecosystems. However, the anticipated clear cutting on private lands would result in habitat loss from tree removal, especially because the forests that regenerate tend to be denser and thus less suitable for Lewis's woodpeckers. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres overlapping reasonably foreseeable activities, approximately 22,941 acres within the cumulative effects analysis area would be affected, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with the actions described above would contribute to habitat loss. However, suitable habitat removed by the Project is expected to be minimal, and the proposed mitigation actions would compensate for this loss. Construction noise disturbance to potential habitat in the analysis area would be of short duration, lasting about 8 weeks in any location. Therefore, cumulative impacts on the Lewis's woodpecker expected to be insignificant because the combined impacts to the 4.2 percent of the watershed area, including short-term disturbance effects, are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Amendments to the NWFP discuss specific mitigation measures that would help minimize impacts to Lewis's woodpecker and include planting of trees and creation of snags. Noise disturbance from blasting and helicopter activity would be minimized with use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1 -July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1 - July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit cavity nesting species (approximately 30 percent of the route, Appendix N and P of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Riparian Reserves provide suitable foraging and nesting habitat. In the Umpqua and Rogue River National Forest, approximately 7,500 snags would be created in LSR and matrix lands by blasting the tops off live trees or inoculating trees with heart rot decay fungi. Increased snags densities would provide cavity nesters with more nesting and foraging opportunities. For a full description of CMP activities that would benefit this bird species see Appendix O of the BA.

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Lewis's woodpecker because primary breeding habitats, including oak woodlands, would not be impacted by the Project, 3.1 percent of habitat available within the analysis area would be impacted by the Project, and 1.79 percent of snags present within the analysis area would be impacted by the Project.

6.2.2.11 *Purple martin (Progne subis)*

Species Status in the Project Area

The breeding range of the purple martin extends east of the Rocky Mountains to the coast, and also along the Pacific Northwest coast and in parts of the southwestern U.S. They winter in South America. Within Oregon, the purple martin inhabits the Coast Range, Willamette Valley, and numerous colonies along the Columbia River (Marshall et al. 2003). As shown in Table 1, the species is suspected to occur in all three national forests crossed by the Project (Table 1). Neither the Forest Service nor ORBIC location database records contained observations of the purple martin within 5 miles of the Project on Forest Service lands (Forest Service 2006, ORBIC 2012). Partners in Flight Science Committee (2013) estimates 18,000 purple martin in BCR 5, and 50 in BCR 9.

The timing of spring migration for western populations is uncertain; however, they likely begin arriving in Oregon around March and April and continue to arrive until sometime in June (Rosenberg et al. 1991, Gilligan et al. 1994, Marshall et al. 2003). Historically, martins nested primarily within snags in a variety of forested woodland types and are closely associated with water (Table 27; Johnson and O'Neil 2001, Marshall et al. 2003). Due to a reduction in natural cavities and competition with non-native species currently only 5 percent of martins in Oregon nest in non-man-made structures (Horvath 1999). Breeding groups within Oregon vary from solitary nesting pairs to colonial nesting pairs inhabiting a single snag or martin box. They have been found to nest in snags, old pilings, nest-boxes, gourds set on poles within fields, and crevices in man-made structures (Marshall et al. 2003). Nest building occurs from May through July, and fledging occurs in July or August. Purple martins forage over open areas such as rivers, lakes, marshes, and fields. Fall migration typically occurs after fledging, with the last martin leaving Oregon about mid-September (Marshall et al. 2003).

Current population sizes within Oregon are unknown; however, a study conducted by the ODFW in 1998 found 784 purple martin pairs distributed within known colony locations (Horvath 1999). In Oregon, populations have increased 5.6 percent annually between 2001 and 2011 (Sauer et al. 2012). Current threats to the purple martin include activities that increase European starling and house sparrow populations, as these species compete with purple martins for nest cavities.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable purple martin habitat within 3,200 feet of the proposed action in the three national forests crossed by the Project. Table 27 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 27. Purple Martin Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood Forests	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer-Hardwood Forest	Generally Associated	Feeds and Breeds	312.20	93.17	11,980	3.38%
Westside Oak and Dry Douglas-fir Forests And Woodlands	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Herbaceous Wetlands	Generally Associated	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.08	0.00	40	0.20%
Developed-Urban and Mixed Environs	Generally Associated	Feeds and Breeds	27.72	0.00	28	98.98%
Coastal Dunes and Beaches	Generally Associated	Feeds	1.54	0.00	2	77.00%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.53	0.09	207	0.30%
Bays and Estuaries	Closely Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**342.07**	**93.26**	**12,285**	**3.54%**

1/ Totals taken from Table 6 for all three national forests in which the species has been suspected to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been suspected to occur; does not include habitat located on other federal or non-federal lands.

Pipeline construction could negatively impact this species by reducing the availability of nesting habitat by removing snags, or by directly destroying nests. The Project would remove 1.79

percent of snags available within the analysis area. Of potential habitat within the analysis area, about 4 percent would be impacted by Project construction. As noted above, no records of purple martins have been documented within 5 miles of the Project area. Additionally, only 5 percent of martins in Oregon nest in non-man-made structures. Given the minimal amount of habitat impacted and common use of man-made nesting sites, there is a low possibility of encountering nesting martins in the Project area.

If nonbreeding martins were present in the area of Project construction, they could be disturbed, but would likely move away into nearby suitable habitat. Project construction would take place over about 8 weeks at any given location. As shown in Figure 2, construction activities would take place during the breeding season in some areas; however, timber removal would occur outside the core migratory bird breeding season (April 1 -July 15).

As noted above, European starling and house sparrow populations compete with purple martins for nest cavities. Increased edge created by the Project could assist in these nuisance species expanding their range into previously unoccupied areas.

Cumulative Effects

The purple martin cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 13). Human encroachment within national forests has increased non-native bird populations such as European starling that are adaptable to development and can out-compete purple martin for food and nest resources. However, purple martins are able to use a wide variety of habitats, especially if man-made nest structures that exclude invasive species are provided.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Project impacts would include removal of potential nest sites as a result of snag removal, disturbance during construction, and increases in populations of non-native species that compete with purple martins as result of increased edge. However, purple martins may also benefit from the cleared ROW as they forage over clearcuts (ODFW 2014). Additionally, snag creation would compensate for potential nest sites removed during construction.

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). The pre-commercial thinning and timber projects in the national forests could potentially remove snags but would most likely contribute to the long term health of the forest ecosystems. Under the NWFP, LSR's and Riparian Reserves in the area are likely to improve habitat for this species over time.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres overlapping reasonably foreseeable activities, approximately 22,941 acres within the cumulative effects analysis area would be affected, or 4.2 percent of the total watershed area (Table 13). The proposed action as well as the actions described above would contribute to snag removal and increased competition from European starlings, which are the primary threats to this species (ODFW 2014). However, snags removed during construction would be replaced through 1,029 acres of snag creation. Therefore, cumulative impacts on the

purple martin are expected to be insignificant because the combined impacts to the 4.2 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts include ensuring that all construction contractors practice appropriate and responsible trash disposal every day in order to avoid attracting species such as the European starling, creation of snags in large trees strategically left on the edge of the construction ROW by topping and/or girdling trees, and placement of nesting boxes with no perches and cavities small enough to encourage use by native species.

Noise disturbance from blasting and helicopter activity would be minimized with use of blast mats or other devices. Timber removal would be avoided within 0.25 miles of an NSO activity center between March 1 and September 30, and all timber would be removed outside of the core migratory bird breeding season (April 1 -July 15). Pipeline construction, including blasting and helicopter activity, would occur after the NSO critical breeding period (March 1 - July 15) within 0.25 miles of an NSO activity center. These seasonal restrictions would benefit cavity nesting species (approximately 30 percent of the route, Appendix N and P of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Riparian Reserves provide suitable foraging and nesting habitat. In the Umpqua and Rogue River National Forest, approximately 7,500 snags would be created in LSR and matrix lands by blasting the tops off live trees or inoculating trees with heart rot decay fungi. Increased snags densities would provide cavity nesters with more nesting and foraging opportunities. For a full description of CMP activities that would benefit this bird species see Appendix O of the BA.

Impact Determination

In considering the potential direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for purple martin because timber felling would occur outside of the breeding season, 1.79 percent of snags available within the analysis area would be removed by the Project, and of potential habitat within the analysis area, about 4 percent would be impacted by Project construction.

6.2.2.12 *Tricolored blackbird (Agelaius tricolor)*

Species Status in the Project Area

More than 99 percent of the restricted range of this blackbird is in California. In Oregon, there are scattered, intermittent breeding colonies, most consistently in Klamath and Jackson Counties, but also in Lake, Crook, and Umatilla Counties (Spencer 2003c). As shown in Table 1, the species has been documented in the Rogue River and Winema national forests; it has not been documented and is not suspected to occur in the Umpqua National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the tricolored

blackbird 5 miles of the Project on NFS lands (Forest Service 2006, ORBIC 2012). However, two records of this species near the proposed ROW are known, one 1.0 mile from the pipeline and one 1.8 miles away; these records are located on state and private land, respectively (Forest Service 2006, ORBIC 2012). Partners in Flight Science Committee (2013) has not estimated the tricolored blackbird population in BCR 9.

Nesting colonies are established in freshwater marshes dominated by cattails or hardstem bulrush, nettles, thistles, willows (Table 28; Johnson and O'Neil 2001). Himalayan blackberries, and other substrates are also used (Beedy and Hamilton 1999, Spencer 2003c). Colonies can be huge and include up to 100,000 nests, with nests only a foot apart from each other (Beedy and Hamilton 1999, Spencer 2003c). Males arrive and begin defending territories in late February. Eggs are laid mid-March through early April, hatching occurs in June and July, and breeding colonies are usually abandoned by mid-August (Beedy and Hamilton 1999). Important foraging habitats are dairies, feedlots, irrigated pastures, lightly grazed rangelands, dry seasonal pools, and mowed alfalfa fields (Beedy and Hamilton 1997). Tricolored blackbirds will follow and consume any locally abundant insect resource including grasshoppers, and also take grains, snails, and small clams (Beedy and Hamilton 1999).

Adults in California numbered at least 162,000 in 2000, and there are 3,000 to 4,000 estimated tricolored blackbirds in Oregon (NatureServe 2013). In western breeding bird survey region, populations have increased 3.3 percent annually between 2001 and 2011; however, these estimates have a high degree of uncertainty (Sauer et al. 2012). Threats to the species include conversion of nesting habitat to agriculture, predation and destruction of nesting colonies during agricultural activities and wetland dewatering (Churchwell et al. 2005).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable tricolored blackbird habitats within 3,200 feet of the proposed action in the jurisdictional boundaries discussed above. Table 28 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 28. Tricolored Blackbird Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed [1/]	Total Acres Modified [1/]	Total Acres in Analysis Area [2/]	Percentage Impacted
Herbaceous Wetlands	Closely Associated	Feeds and Breeds	0.00	0.00	27	0.00%
Agriculture, Pastures, and Mixed Environs	Generally Associated	Feeds and Breeds	0.00	0.00	0	0.00%
Total			**0.00**	**0.00**	**27**	**0.00%**

1/ Totals taken from Table 6 for the Rogue River and Winema national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River and Winema national forests in which the species has been documented to occur; does not include habitat located in the Umpqua National Forest or on other federal or non-federal lands.

The closest documented occurrence of this species is 1 mile from the Project area, outside of NFS lands. Additionally, zero acres of wetland are expected to be impacted by the Project within the analysis area. Given the large colonial nesting habits of this species, and the lack of documented occurrence and lack of habitat impacted, we would not expect breeding birds to be impacted by the Project.

Pipeline construction could affect nonbreeding tricolored blackbirds if they are in the area by disturbing birds. We assume that birds would be able to move away from the disturbance into nearby suitable habitat without significant effects.

Cumulative Effects

The tricolored blackbird cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Winema and Rogue River national forests (Table 13). The quality and quantity of tricolored blackbird habitat has been reduced with fire, agricultural development, and pesticide application (Spencer 2003c). Although one-third of Oregon wetlands, the main type of habitat used by tricolored blackbirds, are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990). The NWFP protects wetlands through land use allocations and directed management techniques; this should improve the quantity and quality of tricolored blackbird habitat in the future.

Construction of the pipeline and associated facilities would affect 962 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 13). As noted above, very little tricolored blackbird habitat would be impact, and no known breeding sites would be impacted. Mitigation actions proposed for federal lands are not expected to affect tricolored blackbirds. Noxious weed treatments could potentially affect tricolored blackbirds as Himalayan blackberries can be used as nests; however, herbicides would not be used in or within 100 feet of waterbodies, which is where nesting occurs, so no effects are anticipated. Planned projects within the cumulative effects analysis area are not expected to impact wetlands, and thus are unlikely to have negative impacts on tricolored blackbirds. Lightly grazed rangelands are an important foraging habitat (Beedy and Hamilton 1997); the proposed grazing projects within the cumulative effects analysis area could benefit tricolored blackbirds by providing such habitat (Table 12).

The proposed action as well as other planned projects are not expected to contribute to conversion of nesting habitat to agriculture, predation and destruction of nesting colonies during agricultural activities, and wetland dewatering, which are threats to this species (Churchwell et al. 2005). Project impacts to non-breeding individuals would be short-term, if any. Therefore, cumulative impacts on the tricolored blackbird are expected to be insignificant.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts include the restoration and protection of wetlands and the surrounding landscapes that facilitate the hydrology and function of wetlands. These measures are described in the Upland Erosion

Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Road decommissioning would reduce erosion and fragmentation that facilitates establishment of non-native species such as European starling. For a full description of CMP activities that would benefit the species see Appendix O of the BA.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for tricolored blackbird because breeding habitat is very unlikely to be impacted, and no habitat would be impacted by the Project.

6.2.3 Amphibians

Surveys were not conducted specifically for special status amphibians; however, special status species were documented if observed during other survey activities. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2012), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS database (Forest Service 2006).

6.2.3.1 *Foothill yellow-legged frog (Rana boylii)*

Species Status in the Project Area

The range of the foothill yellow-legged frog extends from the Willamette Valley to southwestern Oregon to northwestern California and down the coastal ranges and Sierra Nevada Mountains to the Los Angeles area (Fellers 2005). As shown in Table 1, the species has been documented in the Umpqua and Rogue River national forests; it has not been documented and is not suspected to occur in the Winema National Forest. The foothill yellow-legged frog has been observed twice within 1-5 miles of the Project in the Umpqua National Forest and once within 1 mile of the Project in the Rogue River National Forest (Forest Service 2006, ORBIC 2012). Three fifth-field watersheds crossed by the Project on NFS land contain current documented sightings of the foothill yellow-legged frog: Upper Cow Creek, Trail Creek, and Little Butte Creek (Olson and Davis 2009 and Appendix C to this BE).

Primary habitat typically includes a variety of conifer and hardwood forest types, typically located in the western and southwestern Cascade Mountains (Table 29; Johnson and O'Neil 2001). Within these habitats the species is typically found in large, 4-5th order streams in forested riparian corridors (Olson and Davis 2009). The species stays very close to permanent streams with rocky, gravelly, or sandy bottoms (Leonard et al. 1993), though cobble-sized rocks are necessary for egg-laying (Fellers 2005). They breed from early April to early June (Leonard et al. 1993, Fellers 2005). Diets include flies, moths, hornets, ants, beetles, grasshoppers, water striders, and snails (Fellers 2005). Overwintering appears to occur within and along the edges of streams and rivers, under various loose substrates (e.g., woody debris, rocks, etc.) and in seeps along the stream margin (Rombough 2006).

In Oregon, the foothill yellow-legged frog appears to be extirpated from 55 percent of its historical range (Csuti et al. 2001). Olson and Davis (2009) identify three primary threats including, 1) stream habitat loss or alteration from water impoundments that inundate habitats or alter natural flow regimes, causing fluctuations in water levels and altering water temperatures, 2) introduced species such as smallmouth bass and bullfrogs due to predation and competition, and 3) stream habitat loss or alteration from agricultural practices including re-routing stream channels and fluctuations in water levels caused by irrigation.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes aquatic areas within the above listed habitat types, within 3,200 feet of the proposed action on the Umpqua and Rogue River national forests. Table 29 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 29. Foothill Yellow-Legged Frog Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood Forests	Generally Associated	Feeds	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer and Hardwood Forests	Generally Associated	Feeds	263.13	88.78	11,718	3.00%
Westside Riparian Wetlands	Generally Associated	Feeds and Breeds	0.08	0.00	40	0.20%
Total			**263.21**	**88.78**	**11,758**	**2.99%**

1/ Totals taken from Table 6 for the Umpqua and Rogue River national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Umpqua and Rogue River national forests in which the species has been documented to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands.

Based on these habitat associations, approximately 3 percent of available habitat within the analysis area would be affected by the Project.

According to Olson and Davis (2009), 113 of 177 known sites for this species (64 percent) occur on federal lands. Of these sites, 79 (70 percent of federal sites) occur within LSR, and all occur within Riparian Reserves. Within the analysis area, 14.25 acres of the forested habitat identified above that would be removed is within Riparian Reserves (Table 7), and 3.36 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 8). These forested habitats include LO, MS, and CR habitats (Table 7 and 8). These areas likely represent high quality habitat as they are forested and adjacent to water, which are important habitat components for the foothill yellow-legged frog.

During construction, adults and juveniles could suffer direct mortality from trampling during water body crossings. Within the three fifth-field watersheds crossed by the Project on NFS land where foothill yellow-legged frogs are known to occur (Upper Cow Creek, Trail Creek, and Little Butte Creek), the Project would affect ten streams. Eight of these streams would be crossed using the dry open-cut methods, one ephemeral drainage is located within a TEWA but the drainage itself would be avoided by construction, and one stream is located within a TEWA, but would be crossed using an existing culvert (Appendix C). Olson and Davis (2009) recommend timing activities at foothill yellow-legged frog sites to avoid the breeding season (early April to early June) in order to maintain these local populations. Within the range of the NSO, Pacific Connector has indicated that they would remove timber outside of the entire NSO breeding season (after September 30 and before February 28), and construct outside the early breeding season (after July 15 and before February 28) within at least 0.25 miles of activity centers. As the analysis area for foothill yellow-legged frog is within the range of the NSO, these timber removal and construction restrictions would also minimize impacts to breeding foothill yellow-legged frogs. On all construction spreads, Pacific Connector would remove timber outside of the core migratory bird breeding season (April 1 -July 15).

This species could also experience habitat loss and modification due to construction. Removing timber for the Project could impact the foothill yellow-legged frog even if it occurs outside the breeding season. Timber removal may contribute to elevated stream water temperatures and sedimentation of downstream reaches, which may adversely affect frogs. Loss of standing green trees reduces the future potential for down wood recruitment in streams, which function to provide complex instream habitats including slow water areas that may be preferred by frogs for breeding (Olson and Davis 2009). As new trees regenerate, their smaller sizes likely would not provide the same functions as large down wood, and larger wood may not be available for several decades to centuries. However, foothill yellow-legged frogs have been found in stream reaches with limited down wood, so the importance of large wood is uncertain across the range of the species (Olson and Davis 2009). Additionally, the Project would clear a narrow corridor across streams so LWD recruitment would still occur from upstream and downstream habitat, and the associated increases in temperature and sediment would be minimal. Sedimentation would occur during Project construction and would be a short-term impact. The two habitat-based primary threats to foothill yellow-legged frogs are related to permanent diversions or

impoundments that alter natural flow regimes (Olson and Davis 2009), which differ from the Project's short-term impacts on sedimentation and potential long-term impacts on instream LWD and temperature.

Other impacts include the potential for the ROW corridor to facilitate the spread of bullfrogs, which may prey on foothill yellow-legged frog larvae, juveniles or adults, and compete with foothill yellow-legged frog larvae for algae (Kupferberg 1997, Olson and Davis 2009). Introduced species are listed as a primary threat to foothill yellow-legged frogs due to predation and competition. Although Pacific Connector has indicated in their Integrated Pest Management Plan (Appendix N to the Plan of Development [POD]) that they would control for noxious plant species as well as forest pathogens and soil pests, they have not developed measures to prevent bullfrog invasions into waterbodies crossed by the Project. Therefore, the spread of bullfrogs to waterbodies crossed by the Project may adversely affect the foothill yellow-legged frog populations at these locations.

Cumulative Effects

The foothill yellow-legged frog cumulative effects analysis area includes the three fifth field watersheds crossed by the Project on NFS lands where this species occurs: Cow Creek, Trail Creek, and Little Butte Creek. Foothill yellow-legged frog habitat has been negatively impacted by human activities over the last 200 years. Development has tended to concentrate around bodies of water, increasing disturbance, eliminating habitat, and encouraging the spread of mesopredators where these frogs live. Wetlands have also been lost due to draining and conversion to other land uses. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (ODSL and OPRD 1989, Dahl 1990).

Suitable foothill yellow-legged frog habitat would be removed during construction. Construction of the pipeline and associated facilities would affect 984 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 13). The Project could also facilitate the spread of bullfrogs, which is listed as one of three primary threats to this species (Olson and Davis 2009). However, the Project would not contribute to the other primary threats to this species, stream habitat loss from water impoundments as well as from agricultural practices (Olson and Davis 2009).

Mitigation actions proposed for federal lands that affect resources used by the foothill yellow-legged frog include fish passage, fuels reduction, noxious weed treatment, road storm proofing, road decommissioning, in stream LWD placement, and stream crossing repair projects. Mitigation actions on federal lands would affect 3,967 acres within the cumulative effects analysis area, or 1.3 percent of the total watershed area (Table 13). Potential negative effects include detrimental effects from herbicide if used during noxious weed treatments; however BMPs and avoidance of waterbodies during use should limit these impacts. Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term

beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Fuels reduction and in-stream LWD placement projects would also benefit the foothill yellow-legged frog. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing, and biological projects (Table 12). Planned projects on the Umpqua National Forest include nine projects within the Upper Cow Creek and Trail Creek watersheds (Table 12). Forest Service projects include several timber treatments, a livestock grazing allotment, a fuelbreak project, and an aquatic restoration project; other projects include clearcutting on private lands, and a BLM timber sale and three forest management projects (Table 12). On the Rogue River National Forest, there are 12 planned projects within the Little Butte Watershed. Forest Service projects include eight grazing allotments and one quarry; other projects include three BLM forest management projects (Table 12). These Projects would be implemented across 11,643 acres, or approximately 4 percent of the three watersheds (Table 13).

The thinning and aquatic habitat restoration projects would most likely contribute to the long term health of the ecosystems, and could improve habitat conditions for the foothill yellow-legged frog. However, the clearcuts, timber sales, and livestock grazing allotments could contribute to the further loss or degradation of foothill yellow-legged frog habitat. Specifically, similarly to the Project, timber removal from clearcuts and timber sales could remove upland habitat, and degrade instream habitat by increasing sedimentation and temperature in streams and reducing LWD recruitment. Livestock grazing may result in bank erosion, degrading shorelines and increasing stream sedimentation, and thus could directly impact instream habitats for frogs (Olson and Davis 2009).

Management guidelines under the NWFP are integral to species conservation (Olson and Davis 2009). The NWFP protects wetlands and Riparian Reserves; this protection provides connectivity between subpopulation and allows dispersal, minimizes impacts from livestock use, and prohibits timber harvest (Forest Service and BLM 2001). In the Olson and Davis (2009) population analysis, of the 177 current sites at the 500-meter spatial scale, 113 sites (64 percent) occur on federal lands. Of these, 79 (70 percent of federal sites) occur within the LSR land-use allocation and 34 (30 percent) sites occur within the Matrix or Adaptive Management Area land-use allocations, where timber management is a priority. However, all 113 sites are within Riparian Reserves, and are thus protected. The species also occurs in 17 of 34 federally designated Key Watersheds which form a system of large refugia for maintaining and recovering habitat for at-risk fish species and providing high quality water (Olson and Davis 2009). Federal protection of water bodies, wetlands, and Riparian Reserves would likely increase the quantity and quality of foothill yellow-legged frog habitat in the future.

The proposed Project, including mitigation actions, would affect approximately 4,951 acres. Combined with 11,643 acres overlapping reasonably foreseeable activities, approximately 16,594 acres within the cumulative effects analysis area would be affected, or 5.3 percent of the total watershed area (Table 13). The proposed action could facilitate the spread of bullfrogs, which is listed as a primary threat to this species. The Project is not expected to contribute stream habitat loss from water impoundments and agricultural practices, which are also listed as primary threats to this species (Olson and Davis 2009). Additionally, both the Project mitigation and the reasonably foreseeable Projects are expected to benefit the foothill yellow-legged frog. Therefore, cumulative impacts on the foothill yellow-legged frog are expected to be insignificant because the combined impacts to the 5.3 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific mitigation measures that would help minimize impacts include the containment and safe disposal of hazardous materials and pollutants as discussed in Pacific Connector's Spill Prevention, Containment, and Countermeasures Plan (see Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings (Appendix N of the BE).

As part of the CMP, Riparian Reserves would be restored or maintained through the NWFP Aquatic Conservation Strategy. Additionally, restrictions to timber removal and construction activities that avoid NSO and other migratory bird nesting periods would also reduce noise disturbances during the breeding period for this species (see Appendix L, N, O and P of the BA). Proposed mitigation actions on federal lands that would benefit the foothill yellow-legged frog are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Impacts Determination

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for foothill yellow-legged frog since the proposed Project would cross only eight streams on NFS lands in watersheds occupied by this species, would affect only approximately 3 percent of suitable habitat within the analysis area, and would affect only about 14 acres of forested habitat within Riparian Reserves within the analysis area.

6.2.4 Reptiles

Surveys were not conducted specifically for special status reptiles; however, special status species were documented if observed during other survey activities. The information on sensitive species occurrence is based on several GIS data sources including ORBIC species occurrence records (ORBIC 2012), Johnson and O'Neil (2001) habitat associations, and the

Forest Service NRIS database (Forest Service 2006), as well as personal communication with Forest Service personnel.

6.2.4.1 *Western pond turtle (Actinemys marmorata)*

Species Status in the Project Area

The Western pond turtle is found in the Puget Sound region, the Willamette Valley of Oregon, southwest Oregon, and the western half of California including the Central Valley. In Oregon, they have been found up to elevations of 3,000 feet (Storm and Leonard 1995). Western pond turtles are most common in large river basins in southern Oregon (Storm and Leonard 1995). As shown in Table 1, the species has been documented in all three national forests crossed by the Project (Table 1). The Western pond turtle has been observed twice within 1-5 miles of the Project in the Umpqua National Forest and three times within 1-5 miles of the Project in the Rogue River National Forest; there are no documented observations of the species within 5 miles of the Project on the Winema National Forest (Forest Service 2006, ORBIC 2012).

The Western pond turtle is found in a variety of woodland and grassland habitats and is associated with wetlands and other waters (Table 30; Johnson and O'Neil 2001). Within these habitats, Western pond turtles prefer permanent or intermittent mud-bottomed lakes, marshes, sloughs, and slow-moving rivers that have basking sites such as logs or rocks, which are important for thermoregulation (Storm and Leonard 1995, St. John 2002). Nests can be several hundred feet from water in a variety of vegetation types, and adults sometimes hibernate as far as 1,600 feet from water (Csuti et al. 2001). Their diet includes crayfish, insects, amphibian eggs and larvae, and aquatic plants (St. John 2002).

Numbers of Western pond turtles are apparently declining, especially in the northern part of their range. They are no longer present throughout most of the historical range. Many turtle populations were depleted in the early 1900s when they were harvested for food.

Threats include habitat alteration and fragmentation, and disease (Storm and Leonard 1995). Eggs and young are also vulnerable to increasing predation by introduced bullfrogs, fish species, and raccoons, which are drawn to some areas where pond turtles live by human activity at campsites, resorts, and other developments (St. John 2002).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Western pond turtle habitats within 3,200 feet of the proposed action in three national forests crossed by the Project. Table 30 shows the habitat types in the analysis area with which the species is closely or generally associated, and the acreages of those habitats impacted by the Project.

Table 30. Western Pond Turtle Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed [1/]	Total Acres Modified [1/]	Total Acres in Analysis Area [2/]	Percentage Impacted
Southwest Oregon Mixed Conifer and Hardwood Forests	Generally Associated	Feeds and Breeds	312.20	93.17	11,980	3.38%
Ponderosa Pine Forest and Woodlands	Generally Associated	Feeds and Breeds	0.01	0.00	958	0.00%
Westside Grassland	Generally Associated	Feeds and Breeds	2.53	0.32	11 [3/]	26.74% [3/]
Herbaceous Wetlands	Closely Associated	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	Closely Associated	Feeds and Breeds	0.08	0.00	40	0.20%
Open Water-Lakes, Rivers, and Streams	Closely Associated	Feeds	0.53	0.09	207	0.30%
Total			**315.36**	**93.58**	**13,223**	**3.30%**

1/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat associations, approximately 3 percent of available habitat within the analysis area would be affected by the Project. However, these acreages may overestimate suitable habitat as these areas are not necessarily in close enough proximity to water to be used by Western pond turtles. According to Stone (2009a), the majority of Western pond turtle populations on NFS and BLM land in Oregon and Washington occur within Riparian Reserves. Excluding altered habitat, approximately 19 acres within Riparian Reserves would be removed by the Project within the analysis area (Table 7), and 5 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 8). These habitats include LO, MS, CR forested habitats, as well as unaltered non-forested habitats (Tables 6 and 7). These areas likely represent high quality habitat as they are adjacent to water, which is an important habitat components for Western pond turtles.

Habitat destruction, alteration, and fragmentation is listed as the single greatest threat to Western pond turtles (Stone 2009a). The Project would impact habitat as described above; however, these impacts would be minor and affect habitat only minimally compared to the activities listed by Stone (2009a) as causing habitat impacts, including conversion of wetlands to farmland, water diversions and dams, channelization, mining, timber clearing, and urbanization.

The proposed action could cause direct mortality if individuals were not able to get out of the way of construction, or if emerging juveniles, nests, or eggs were in the proposed ROW. However, only two western pond turtle sites have been documented within 3 miles of the Project on NFS lands, both on the Umpqua National Forest greater than 1 mile from the Project (Forest Service 2006, ORBIC 2012). These sites are 1.8 miles northeast of MP 105.24, and 1.5 miles southwest of MP 109.68, and include 6-20 observations of Western pond turtle at each site (Forest Service 2006, ORBIC 2012, Stone 2009a). Although western pond turtles travel across terrestrial habitat to nest and overwinter, these movements are generally limited to within 1,600 feet of water (0.3 mi; Csuti et al. 2001, Reese and Welsh 1997), so individuals traveling from the known sites on the Umpqua National Forest to nest or overwinter would not be impacted by the Project. Pond turtles additionally disperse over land and along waterways, but long distance movement patterns are still poorly understood (Rosenburg et al. 2009). Dispersing individuals could be present along the ROW, and be impacted by equipment or Project vehicles.

An additional analysis of western pond turtle nesting habitat was conducted at the request of ODFW per their February 12, 2015 comment on the DEIS (FERC 2014) that all habitats within 0.5 miles of a waterway or wetland known to contain Western pond turtles be assumed to be suitable nesting habitat if they meet certain criteria, including vegetation consisting of primarily of sparse grasses and forbs. Currently, there are no waterways or wetlands known to contain Western pond turtles within 3 miles of the Project on the Winema National Forest nor on the Rogue River National Forest, but there are two such sites on the Umpqua National Forest as discussed above (Yamamoto 2015a). Both occurrences are of turtles in ponds surrounded by forest: one in McGill Pond (aka Sands Pond) most recently observed in 2000, the other in a small pond in a meadow near Callahan Creek Road last observed in 1993. Based on Pacific Connector's digitized vegetation-land use data revised from aerial photography, no grasslands are present within the Project ROW within 0.5 miles of these two sites; therefore, no suitable nesting habitat would be impacted by the Project.

Both known Western pond turtle locations on the Umpqua National Forest were associated with Lake/Pond features in the National Hydrography Dataset (USGS 2014). An additional seven Lake/Pond features within 0.5 miles of the Project on the Umpqua National Forest were also identified as potentially occupied western pond turtle habitat. However, no grasslands are present within the Project ROW within 0.5 miles of any of the seven sites identified as potentially occupied by western pond turtles either. Therefore, the absence of suitable vegetation cover along the Project within the Umpqua National Forest precludes any suitable nesting habitat from being affected by the Project.

Other impacts include the potential for the ROW corridor to facilitate the spread of nonnative and native predators such as bullfrogs, raccoons, spotted skunks, coyote, fox, feral and domestic dogs, black bear, river otter, mink, osprey, bald eagle, and largemouth bass (Holland 1994). Stone (2009a) list predation as a threat the Western pond turtles; however, they note that many large populations of turtles occur in the presence of these predators so the threat does not appear to be universal (Stone 2009a). All trash, food waste, and other items attractive to

predators would be picked up and removed from the Project area on a daily basis to minimize potential predation of Western pond turtles.

Cumulative Effects

The Western pond turtle cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema, and Rogue River national forests (Table 13). Most of the habitats used by these turtles have been impacted severely in the past 200 years. Development has concentrated around bodies of water, increasing disturbance, eliminating habitat, and encouraging the spread of mesopredators. Wetlands have been drained and converted to agriculture and huge amounts of grassland habitat has been lost. The NWFP addresses many of these issues, and management activities taking place within the analysis area should increase the quality of Western pond turtle habitat in the future.

Suitable Western pond turtle habitat would be removed during construction. Construction of the pipeline and associated facilities would affect 2,181 acres within cumulative effects analysis area, which constitutes 0.4 percent of the total watershed area (Table 13). The Project could also facilitate the spread of predators such as bullfrogs and raccoons. Both habitat alteration and fragmentation, and increasing predation by introduced species are listed as a threat to this species (St. John 2002).

Mitigation actions proposed for federal lands that affect resources used by the Western pond turtle include fish passage, fuels reduction, road storm proofing, road decommissioning, in stream LWD placement, and stream crossing repair projects. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Fuels reduction and in-stream LWD placement projects would also benefit the Western pond turtle. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). They would affect 13,026 acres, or 2.4 percent of the cumulative effects analysis area. Planned projects on the Umpqua National Forest include 14 projects within the Elk Creek, Upper Cow Creek and Trail Creek watersheds (Table 12). Forest Service projects include a weed treatment project, several timber treatments, a grazing allotment, a fuelbreak project, and various aquatic restoration projects; other projects include clearcutting on private lands, and a BLM timber sale and three forest management projects (Table 12). On the Rogue River National Forest, there are 12 planned projects within the Little

Butte Watershed. Forest Service projects include eight grazing allotments and one quarry; other projects include three BLM forest management projects (Table 12). On the Winema National Forest, there are 4 planned projects within the Spencer Creek Watershed that consist of a grazing allotment, road maintenance, a noxious weed treatment and a timber harvest project (Table 12). The large number of thinnings combined with the aquatic habitat restoration would most likely contribute to the long term health of the ecosystem. However, the timber sales, grazing allotments, and clearcuts could contribute to habitat alteration and disturbance within the vicinity of the proposed Project.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with the 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the Western pond turtle cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action, as well as reasonably foreseeable actions, would contribute to habitat loss and alteration, as well as the potential to increase predation from non-native species. However, Project mitigation is expected to benefit the Western pond turtle. Additionally, construction BMPs that require all trash to be removed daily would minimize potential predation of Western pond turtles. Therefore, cumulative impacts on the Western pond turtle are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize impacts include the containment and safe disposal of hazardous materials and pollutants as discussed in Pacific Connector's Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings.

As part of the CMP, Riparian Reserves would be restored or maintained through the NWFP Aquatic Conservation Strategy. Additionally, restrictions to timber removal and construction activities that avoid NSO nesting periods would also reduce noise disturbances during the breeding period for this species (see Appendix L, N, O, and P of the BA). Also, all trash, food waste, and other items attractive to predators would be picked up and removed from the Project area on a daily basis to minimize potential predation of Western pond turtles. Proposed mitigation actions on federal lands that would benefit the Western pond turtles are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the potential direct, indirect, and cumulative impacts, it is determined that the proposed action **"may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Western pond turtle because impacts would be limited to dispersing individuals as there are no known or suspected

nesting or overwintering sites within 1 mile of the Project on NFS land, and the Project would impact only approximately 3 percent of potentially suitable habitat within the analysis area.

6.2.5 Fish

Surveys were not conducted specifically for special status fish. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2012), the StreamNet database (StreamNet 2008), and the Forest Service NRIS database (Forest Service 2006).

6.2.5.1 *Umpqua chub (Oregonichthys kalawatseti)*

Species Status in the Project Area

Umpqua chub can be found throughout most of the Umpqua River in Douglas County; from the mouth of the Smith River in the north to Cow Creek and the South Umpqua River, near the boundary of the Umpqua National Forest, in the south (Markle et al. 1991). As shown in Table 1, the species has been documented in the Umpqua National Forest; it has not been documented and is not suspected to occur in the Winema or the Rogue River national forests.

The Umpqua chub inhabits areas which contain eroded or depositional substrates with moderate to low flowing waters. They gather near the banks in shallow waters, and prefer habitats with riparian cover and abundant aquatic vegetation. Spawning occurs primarily in rocky areas. The Umpqua chub's diet consists of bottom-dwelling chironomids and other organisms (Markle et al. 1991).

The main threat to this species is the increasing population of invasive smallmouth bass (NatureServe 2013).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes waterbodies crossed within the South Umpqua sub-basin, where this species is found. Umpqua chub are assumed to be present in 4 of the 7 streams within the analysis area that would be impacted by the Project (Table 31; further detail in Appendix C). One of those streams would be within a TEWA and not directly affected; it currently flows through a culvert under a road that would be part of the TEWA. The other affected waterbodies would be crossed using a dry open cut during the in-water work window recommended by ODFW. The dry open cut method used would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to eggs with this process, but adults and juveniles would likely stay with the streamflow and avoid negative effects. Turbidity increases are generally low using this crossing method but could increase temporarily. Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing sedimentation.

The Project would not contribute to the main threat to this species, the increasing population of invasive smallmouth bass.

Table 31. Umpqua Chub Potential Habitat

Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size	Proposed Crossing Method Scour Level	Chub Potentially Present
Trib. to East Fork Cow Creek (GW014/FS-HF-C)	1229383427835 Forest Service – Umpqua NF	109.17	Perennial (FS – Interpretation) Intermediate	Dry Open-Cut	No
Trib. to East Fork Cow Creek (GSI016/FS-HF-F)	1229369427819 Forest Service – Umpqua NF	109.33	Intermittent Minor	Dry Open-Cut	No
East Fork Cow Creek (GSP019/FS-HF-G)	1229918428021 Forest Service – Umpqua NF	109.47	Perennial Intermediate	Dry Open-Cut (Streambed-bedrock) [12]	Assumed
East Fork Cow Creek (GSP022/FS-HF-G ASP297)	1229918428021 Forest Service – Umpqua NF	109.69	Perennial Intermediate	Adjacent to centerline within TEWA-flows through culvert	Assumed
Trib. to East Fork Cow Creek (FS-HF-J/AW298)	1229332427779 Forest Service – Umpqua NF	109.69	Perennial Minor	Dry Open-Cut	Assumed
Trib. to East Fork Cow Creek (FS-HF-K/AW299)	1229332427781 Forest Service – Umpqua NF	109.78	Perennial Minor	Dry Open-Cut	Assumed
Trib. to East Fork Cow Creek (ESI068/FS-HF-N)	Forest Service – Umpqua NF	110.98	Intermittent Intermediate	Dry Open-Cut	No

Cumulative Effects

The Umpqua chub cumulative effects analysis area includes the fifth field watersheds crossed by the Project within the South Umpqua subbasin: Upper Cow Creek, Elk Creek, and Days Creek. Construction of the pipeline and associated facilities would affect 979 acres within the

cumulative effects analysis area, or 0.5 percent of the total watershed area (Table 13). Project impacts would primarily be from potential increases in sediment following construction, and removal of riparian vegetation at the ROW crossing. Neither of these impacts are listed as threats to this species.

Mitigation actions proposed for federal lands that could affect resources used by the Umpqua chub include fish passage, fuels reduction, road storm proofing, road decommissioning, in stream LWD placement, riparian planting, and stream crossing repair projects. Mitigation actions on federal lands would affect 5,374 acres within the cumulative effects analysis area, or 3.0 percent of the total watershed area (Table 13). Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Fish passage projects could also be detrimental to the Oregon chub if barriers are removed that currently prevent or limit the spread of smallmouth bass (Simon 2008). Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas. Fuels reduction and in-stream LWD placement projects would benefit the Oregon chub. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). Forest Service projects that could additionally impact the Umpqua chub include a grazing allotment that could cause direct mortality of eggs by crushing, and several timber treatments that could potentially increase sedimentation and disturb riparian vegetation. Multiple aquatic restoration projects within the South Umpqua sub-basin would benefit water quality and fish habitat within the watershed. Restoration projects include culvert replacements, Riparian Reserve timber thinning and road decommissioning.

The NWFP identifies restoration and maintenance of Riparian Reserves as a goal on Forest Service land. Riparian Reserves include the hydrologic, geologic or ecological features within a watershed that affect stream processes. Actions to improve aquatic habitat surrounding Riparian Reserves includes limiting livestock grazing and commercial timber harvest. These management activities may result in improved quantity and quality of Umpqua chub habitat in the analysis area in the future.

The proposed Project, including mitigation actions, would affect approximately 6,353 acres. Combined with 3,189 acres overlapping reasonably foreseeable activities, approximately 9,542 acres within the cumulative effects analysis area would be affected, or 5.3 percent of the total watershed area (Table 13). The proposed action as well as planned projects could temporarily increase sediment and remove riparian vegetation; however, Project impacts would be mitigated

as described above, and planned aquatic restoration projects would also benefit the Umpqua chub. The Project would be unlikely to contribute to the main threat to this species, the increasing population of invasive smallmouth bass. Therefore, cumulative impacts on the Umpqua chub are expected to be insignificant because the combined impacts to the 5.3 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

Specific conservation measures to minimize impacts to the Umpqua chub include backfill of perennial waterbodies. Material would be removed from the trench, with the upper 1-foot of the trench backfilled with clear gravel or native cobbles appropriate for resident fish. The bottom and banks would be returned to preconstruction contours, banks would be stabilized, and temporary sediment barriers would be installed before returning flow to the waterbody channel. If fish are present, a fish salvage plan would be followed to reduce mortality from construction. These activities are described in the Conservation Measures and Fish Salvage Plan documents (see Appendices N and T of the BA). Proposed mitigation actions on federal lands that would benefit the Umpqua chub are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Umpqua chub because the waterbody crossings would be conducted with minimal damage to the species, and the Project would be unlikely to contribute to the major threat to this species, which is the spread of smallmouth bass.

6.2.5.2 *Upper Klamath redband trout (Oncorhynchus mykiss newberrii)*

Species Status in the Project Area

The distribution of Upper Klamath redband trout is limited to various streams within the Upper Klamath Lake basin (ODFW 2005). As shown in Table 1, the species has been documented in the Winema National Forest; it has not been documented and is not suspected to occur in the Rogue River or the Umpqua national forests.

The Klamath redband trout is found within mid-size or small streams located in highly erosive landscapes with high gradients, steep slopes, high solar radiation, and mean annual air temperatures less than 48 degrees Fahrenheit (Thurow et al. 2007). Their diet consists primarily of smaller fish.

Threats to this species include habitat alteration resulting in low flows and high temperatures and stream blockage such as dams (NatureServe 2013).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes waterbodies crossed within the Upper Klamath River sub-basin where this species may be found. Upper Klamath redband trout are assumed to be present in the four streams within the analysis area that would be impacted by the Project (Table 32; further detail in Appendix C). The affected waterbodies would be crossed using a dry open cut during the in-water work window recommended by ODFW. The dry open cut method used would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to eggs with this process, but adults and juveniles would likely stay with the streamflow and avoid negative effects. Turbidity increases are generally low using this crossing method but could increase temporarily. Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing sedimentation.

Table 32. Upper Klamath Redband Trout Potential Habitat

Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size	Proposed Crossing Method Scour Level	Trout Potentially Present
Spencer Creek (EW085)	1220277421487 Forest Service-Winema NF	171.07	Intermittent Minor	Dry Open-Cut	Redband Trout Possible
Trib. to Spencer Creek (GSP007)	1221988422850 Forest Service-Winema NF	171.57	Perennial Minor	Dry Open-Cut	Unknown
Trib. to Spencer Creek (EW107)	1221837422760 Forest Service-Winema NF	172.48	Intermittent Minor	Dry Open-Cut	Unknown
Trib. to Spencer Creek (ESI106)	Forest Service-Winema NF	173.74	Intermittent Minor	Dry Open-Cut	Assumed

Cumulative Effects

The Upper Klamath redband trout cumulative effects analysis area consists of the Spencer Creek fifth field watershed. Construction of the pipeline and associated facilities would affect 231 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Project impacts would primarily be from potential increases in sediment following construction, and removal of riparian vegetation at the ROW crossing.

Several mitigation projects have been identified in the Spencer Creek watershed that would benefit Upper Klamath redband trout by reducing sedimentation and improving riparian vegetation conditions in the long term. Riparian planting is proposed for Spencer Creek, downstream of the Project crossing. Shade provided by the plantings would contribute to moderating water temperatures in Spencer Creek, and root strength provided by new vegetation would increase bank stability and decrease erosion and sediment depositions to Spencer Creek. Fencing between the Project ROW and an adjacent grazing allotment has been proposed in order to keep cattle from grazing newly re-vegetated areas in the Project corridor, including areas where the corridor crosses Spencer Creek, thus helping to ensure that erosion control and re-vegetation objectives are met. Approximately 1.0 mile of LWD placement is proposed for Spencer Creek to mitigate Project effects by adding structural complexity to the aquatic system, trapping fine sediments, and potentially reducing the stream temperature over time. Road decommissioning and ford hardening within the cumulative effects analysis area would also improve habitat for the redband trout. Spencer Creek appears on the Oregon Department of Environmental Quality 303(d) list as water quality impaired from increased sedimentation (ODEQ 2012). Improvements along Spencer Creek would immediately benefit all downstream aquatic habitats, including those used by the Upper Klamath redband trout. Mitigation actions on federal lands would affect 397 acres within the cumulative effects analysis area, or 0.7 percent of the total watershed area (Table 13). These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Forest Service projects that could additionally impact the Upper Klamath redband trout include a grazing allotment that could cause direct mortality of eggs by crushing, and a commercial harvest that could potentially increase sedimentation and disturb riparian vegetation, as well as road maintenance activities and a weed treatment project (Table 12). These proposed projects would result in 70 acres of new disturbance (i.e., excluding continued grazing on existing allotments), or 0.1 percent of the cumulative effects analysis area. The NWFP identifies restoration and maintenance of Riparian Reserves as a goal on NFS land. Riparian Reserves include the hydrologic, geologic or ecological features within a watershed that affect stream processes. Actions to improve aquatic habitat surrounding Riparian Reserves, including areas within the cumulative effects analysis area, includes limiting livestock grazing and commercial timber harvest.

The proposed Project, including mitigation actions, would affect approximately 628 acres. Combined with 70 acres overlapping reasonably foreseeable activities, approximately 698 acres within the cumulative effects analysis area would be affected, or 1.3 percent of the total watershed area (Table 13). The proposed action as well as planned projects could temporarily

increase sediment and remove riparian vegetation; however, Project impacts would be mitigated as described above, and provide overall benefit to Upper Klamath redband trout and its habitat in Spencer Creek. Therefore, cumulative impacts on the Upper Klamath redband trout are expected to be insignificant because the combined impacts to the 1.3 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

Specific conservation measures to minimize impacts to the Upper Klamath redband trout include backfill of perennial waterbodies. Material would be removed from the trench, with the upper 1-foot of the trench backfilled with clear gravel or native cobbles appropriate for resident fish. The bottom and banks would be returned to preconstruction contours, banks would be stabilized, and temporary sediment barriers would be installed before returning flow to the waterbody channel. If fish are present, a fish salvage plan would be followed to reduce mortality from construction. These activities are described in the Conservation Measures and Fish Salvage Plan documents (see Appendices N and T of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Several projects within the Winema National Forest would benefit redband trout and include repair of 26 stream crossings, riparian plantings and in-stream placement of woody debris that would provide cover and improve stream integrity. Road decommissioning would also occur and decrease erosion within the watershed. Within the Spencer Creek watershed, approximately 1 mile of in-stream restoration would occur that directly benefits Upper Klamath redband trout. For a full description of CMP activities that would benefit redband trout see Appendix O of the BA. Proposed mitigation actions on federal lands that would benefit the Upper Klamath redband trout are also described above under cumulative effects, and detailed in Appendix F of the FEIS (FERC 2015).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Upper Klamath redband trout because the waterbody crossings that could affect these species would be conducted with minimal damage to the species, and any impacts that resulted would be temporary.

6.2.6 Terrestrial Invertebrates

Surveys were conducted for special status mollusks in accordance with the "Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the NWFP, Version 3.0" (Duncan et al. 2003). In addition to Forest Service designated sensitive species, target species also included federal and state-listed threatened and endangered species and special-status species, and Region 6 Survey and Manage species (Forest Service and BLM 2001). Surveys were conducted between March 17 and May 23, 2007 and October 13 and November 16, 2007 and covered approximately 1,160 total acres in the three national forests. Surveys for route modifications in 2010 were conducted during spring (June 6 and July 1, 2010) and in fall (October 13 and November 16, 2010) and covered approximately 230 acres (SBS 2011a). Surveys were also conducted in the spring and fall of 2014 and covered approximately 76.5 acres (PCGP April 27, 2015 response to FERC data request). Project-specific surveys for individual insect species were not conducted. The area considered for potential terrestrial invertebrate habitat included all Forest Service-managed lands in Douglas and Jackson and Klamath counties (as well as BLM-managed lands crossed by the Project) within 100 feet of the Project capable of supporting special-status terrestrial invertebrate species. Detail on survey methodology and results are provided in the 2008 and 2010 Biological Survey Reports (SBS 2008, SBS 2011a).

6.2.6.1 *Traveling sideband (Monadenia fidelis celeuthia)*

Species Status in the Project Area

This endemic terrestrial snail is found primarily in Jackson County, Oregon. Stone (2009b) reports occurrences from Medford east and northeast in the eastern Rogue River and Little Butte Creek drainages. As shown in Table 1, the species has previously been documented on the Rogue River National Forest, and was recently documented on the Winema and Umpqua national forests.

The traveling sideband has previously been observed once within 1-5 miles of the Project in the Rogue River National (Forest Service 2006, ORBIC 2012), and was observed at 8 locations during Project surveys on the Rogue River and Winema national forests (between MP154.9-175.3). During surveys in 2007 and 2010, shells and live individuals were located within and outside the ROW, as well as within proposed TEWAs and UCSAs (SBS 2008, SBS 2011a). It was not observed during surveys in 2014 (PCGP April 27, 2015 response to FERC data request).

Traveling sideband is found at low to moderate elevation in unaltered, somewhat dry and open forested terrain (Frest and Johannes 2000). The species is associated with dry basalt talus and rock outcrops in areas with oak/maple overstory, and along springs in rock and moist vegetation and moss (Frest and Johannes 2000).

Threats to the traveling sideband include timber clearing and livestock grazing. Removal or reduction of forest canopy and increased sun exposure from timber clearing or other removal activities can result in drying of important subterranean refugia sites, reduction in fungi food

sources and loss of dormant individuals. Because many species in this genus are partially arboreal, tree felling may result in direct mortality to individuals (Stone 2009b).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable traveling sideband habitat within 700 feet of the proposed action within the Rogue River and Winema national forests. Based on the habitat description above, we inferred that the traveling sideband is associated with the late successional/old growth (i.e., unaltered) Johnson and O'Neil habitat types shown below in Table 33, especially where talus or rock outcrops are present. However, these associations likely overestimate suitable habitat as specific habitat information such as overstory species, presence of talus and rock outcrops, and presence of springs in rock and moist vegetation were not available for this analysis. Nonetheless, Table 32 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the traveling sideband. Because the biology of this species is not well understood (Stone 2009b), general and close associations, as well as activities associated with each habitat type, have not been inferred.

Table 33. Traveling Sideband Habitat Associations

Habitat Type[1/]	Total Acres Removed[2/]	Total Acres Modified[2/]	Total Acres in Analysis Area[3/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood Forests (LO)	0.00	0.00	0	0.00%
Southwest Oregon Mixed Conifer-Hardwood Forest (LO)	186.76	66.49	1,467	17.26%
Ponderosa Pine Forest and Woodlands (LO)	0.00	0.00	66	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands (LO)	0.00	0.00	0	0.00%
Westside Riparian Wetlands	0.08	0.00	9	0.86%
Eastside Riparian Wetlands	0.28	0.00	17	1.63%
Total	**187.13**	**66.49**	**1,560**	**16.26%**

1/ LO, Late Succession/Old Growth assumed to be ≥80 years old.
2/ Totals taken from Table 6 for all three national forests in which the species has been documented to occur.
3/ Totals taken from Table 2 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

Based on these habitat association assumptions, approximately 17 percent of available potentially suitable habitat within the analysis area would be affected by the Project. Additionally, 5.76 acres of late successional/old growth forested habitat that would be removed

within the three national forests is within Riparian Reserves (Table 7), and 1.73 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 8). These areas likely represent high quality habitat as they are forested, unaltered, and adjacent to water, which are important habitat components for the traveling sideband. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates due to the lack of available data on specific habitat components such as talus, rock outcrops, and overstory species composition within the analysis area. Additionally, complete surveys were conducted for mollusks on NFS lands, so impacts to the potentially suitable habitat occupied by this species, assumed to be the highest quality habitat, would be minimized as described below.

Direct mortality could occur to individuals if they are located within the ROW, UCSAs, and TEWAs during Project clearing or construction due to their low mobility. Vegetation removal and grading activities in the construction corridor and in TEWAs would disturb vegetation and soils within sites and could result in injury or mortality to individuals. Clearing of the ROW and TEWAs could impact habitat by removing forest overstory, potentially making the area unsuitable for this species. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate.

Minor route adjustments following the 2007 and 2010 surveys resulted in avoidance of some of the sites observed during Project surveys. Four of the locations within the Rogue River National Forest are outside of the ROW so direct impacts are not expected (MP 157.14, 159.33, 161.36, and 167.10). Two sites within UCSAs and TEWAs are currently proposed to be impacted (MP 154.90 and 164.53). Two locations within the ROW on the Winema National Forest are also currently proposed to be impacted (MP 173.38 and 175.30).

Indirect effects are expected to the traveling sideband sites observed within the analysis area even if direct impacts to these sites are avoided. Construction of the Project would create an open corridor, which would be dominated by early seral vegetation for approximately 30 years. This is a long-term effect that could modify microclimate conditions around populations or individuals adjacent to the corridor during the early seral vegetation phase. All the sites are within approximately 100 feet of Project disturbance, and thus would be affected by these changes in microclimate conditions.

According to the Forest Service NRIS and BLM GeoBOB databases, approximately 28 traveling sideband sites are known from the three national forests crossed by the Project, including the 8 sites on NFS land identified during Project surveys, and 95 sites known from BLM land within the range of the NWFP (Yamamoto 2014, 2015b). Assuming that these 123 sites comprise all existing traveling sideband sites, on NFS lands the Project would indirectly impact approximately 6.5 percent of known sites, although not likely affect site persistence at these locations. The Project would directly impact 4 sites, affecting the site persistence of approximately 3.3 percent of known sites. The 14 sites documented during surveys for the Project (including the 6 sites documented on BLM land, not discussed here) indicate that this species is more abundant and widely distributed than previously thought. However, this analysis conservatively assumes that the 123 confirmed sites comprise all existing traveling sideband sites.

Cumulative Effects

The traveling sideband cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 13). Current threats to the traveling sideband include timber clearing and livestock grazing (Stone 2009b). Loss of woodlands and increased forest fragmentation over the past 200 years may have impacted the traveling sideband. Oak woodlands in Oregon have declined precipitously due to conversion to other land uses, invasive species, and fire suppression. Fragmentation decreases connectivity between populations and reduces dispersal between sub-populations. Livestock tend to concentrate around a water source, which can increase disturbance and eliminate habitat. Concentrated use of riparian areas by livestock may also degrade available loose soil and litter habitat used for foraging and breeding (Stone 2009b).

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Project impacts would include habitat loss and modification, as well as potential mortality of individuals. However, Project impacts are not expected to affect species persistence as described above.

Proposed mitigation actions in the cumulative effects analysis area include reallocation of Matrix to LSR, road decommissioning, pre-commercial thinning, and riparian planting. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). There could be some negative short-term impacts of these actions, including disturbance and trampling of individuals during implementation. However, overall, these projects would benefit the traveling sideband through habitat improvements and a reduction in disturbance over the long term. Reallocation of Matrix to LSR would offset the long-term loss of LSR acres, and thus ensure future availability of late-successional habitat. Decommissioning and planting of selected roads in conjunction with pre-commercial thinning treatments would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Density management of forested stands would assist in the recovery of late-seral habitat, reduce impacts from fragmentation, reduce edge effects, and enhance resilience of mature stands, all of which would benefit this late-successional obligate species. Planting of riparian vegetation would also improve habitat quality for the traveling sideband at these sites. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Planned projects within watersheds where the proposed action crosses NFS lands include a variety of timber, fuel, grazing and biological projects (Table 12). The planned projects would affect 13,026 acres, or 2.4 percent of the cumulative effects analysis area. Planned projects on the Umpqua National Forest include 14 projects within the Elk Creek, Upper Cow Creek and Trail Creek watersheds (Table 12). Forest Service projects include a weed treatment project, several timber treatments, a grazing allotment, a fuelbreak project, and various aquatic restoration projects; other projects include clearcutting on private lands, and a BLM timber sale and three forest management projects (Table 12). On the Rogue River National Forest, there are 12 planned projects within the Little Butte Watershed. Forest Service projects include 8 grazing allotments and one quarry; other projects include three BLM forest management

projects (Table 12). On the Winema National Forest, there are 4 planned projects within the Spencer Creek Watershed that consist of a grazing allotment, road maintenance, a noxious weed treatment and a timber harvest project (Table 12). The proposed grazing allotments could result in habitat destruction or modification, as well as trampling of individuals. The proposed timber projects could also result in impacts to habitat and individuals similar to those expected by the Project. However, the NWFP identifies restoration and maintenance of mossy talus slopes and Riparian Reserves as a goal on NFS land. These management activities may result in improved quantity and quality of traveling sideband habitat in the analysis area in the future.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions would contribute to the threats to this species from timber clearing and grazing. However, Project mitigation would compensate for habitat loss and mortality of individuals during construction. Therefore, cumulative impacts on the traveling sideband are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through the NWFP Aquatic Conservation Strategy. On the Rogue River National Forest restoration of stream crossings and planting in Riparian Reserves would promote shade and cover for the traveling sideband (see Appendices L, O and P of the BA).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals and habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for traveling sideband because the proposed action would affect approximately 17 percent of potentially suitable available habitat within the analysis area, impact approximately 6.5 percent of the known sites (including indirect effects), and directly affect (eliminate) approximately 3.3 percent of known sites, although this species is likely more common than indicated by the NRIS database.

6.2.6.2 *Siskiyou hesperian (Vespericola sierranus)*

Species Status in the Project Area

In Oregon, this land snail is found in Jackson, Klamath, and Douglas Counties. As shown in Table 1, this species has previously been documented on the Rogue River and Winema national forests, and was recently documented on the Umpqua National Forest.

Prior to observations during Project surveys, this species had not been documented within 5 miles of the Project (Forest Service 2006, ORBIC 2012). During Project surveys in 2007 and 2010 this species was observed at 12 locations on the Rogue River and Umpqua national forests (between MP 110.18-164.69). In 2014, this species was observed at 8 locations within the Rogue River and Winema National Forests (between MPs 154.8 and 168.7). Shell fragments and live individuals were observed within and outside the ROW, as well as within proposed TEWAs and UCSAs (SBS 2008, SBS 2011a, PCGP April 27, 2015 response to FERC data request).

The Siskiyou hesperian is associated with riparian areas and other perennially moist habitats and may occur along running water or around permanent ponds and springs (Frest and Johannes 1996, Stone 2009c). The species can be found near spring seeps and deep leaf litter along streambanks and under debris and rocks. Moist valley, ravine, gorge, or talus sites are preferred, near the lower portions of slopes in areas that are not subject to regular flooding. This species has a global status of imperiled (NatureServe 2013). Threats include the diversion or modification of springs for livestock watering and irrigation. Human use may result in loss or degradation of habitat. Removal of forest overstory from timber clearing can dry important subterranean refugia and loss of aestivating individuals. Concentrated use of riparian areas by livestock may also degrade habitat, as can development for agriculture or human use (Frest and Johannes 2000).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Siskiyou hesperian habitat within 700 feet of the proposed action within the three national forests crossed by the Project. Based on the habitat description above, we inferred that the Siskiyou hesperian is associated the Westside Riparian Wetlands and Eastside Riparian Wetlands Johnson and O'Neil habitat types, as shown below in Table 34, especially near the lower portions of slopes at moist valley, ravine, gorge, or talus sites. These associations likely overestimate suitable habitat as specific habitat information such as location on slope and presence of talus were not available for this analysis. Nonetheless, Table 34 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the Siskiyou hesperian. Because the biology of this species is not well understood (Stone 2009c), general and close associations, as well as activities associated with each habitat type have not been inferred.

Table 34. Siskiyou Hesperian Habitat Associations				
Habitat Type	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Westside Riparian Wetlands	0.08	0.00	9	0.86%
Eastside Riparian Wetlands	0.28	0.00	17	1.63%
Total	**0.36**	**0.00**	**27**	**1.35%**

1/ Totals taken from Table 5 for all three national forests in which the species has been documented to occur.
2/ Totals taken from Table 2 for all three national forests in which the species has been documented to occur; does not include habitat located on other federal or non-federal lands.

Based on these habitat association assumptions, approximately 1 percent of available potentially suitable habitat within the analysis area would be affected by the Project. Additionally, 18.01 acres of forested habitat (of all seral stages) that would be removed within the analysis area is within Riparian Reserves (Table 7), and 4.57 of these acres would be maintained in an early seral stage within the 30-foot Project corridor (Table 8). These areas likely represent high quality habitat as they are forested and adjacent to water, which are important habitat components for the Siskiyou hesperian. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates due to the lack of available data on specific habitat components such as talus and location on slope. Additionally, complete surveys were conducted for mollusks on NFS lands, so impacts to the potentially suitable habitat occupied by this species, assumed to be the highest quality habitat, would be minimized as described below.

Direct mortality to individuals could occur if they are located within the ROW, TEWAs, or UCSAs during Project clearing or construction. Vegetation removal and grading activities in the construction corridor and in TEWAs would disturb vegetation and soils within sites documented during Project surveys, and could result in injury or mortality to individuals. Another potential direct effect is destruction or alteration of hydrology of riparian, wetland, or aquatic habitats used by this species. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. The increase in sun exposure could reduce moisture levels and potential decrease dispersal between populations or suitable habitat. Additionally, removal of the forest overstory would dry important subterranean refugia and impact aestivating individuals.

Six of the locations within the Rogue River National Forest are outside of the ROW, UCSAs and TEWAs, so direct impacts are not expected (MP 154.82, 156.78[2], 157.14, 159.33, 161.34). Six sites within the ROW, UCSAs, or TEWAs within the Rogue River National Forest are currently proposed to be impacted (MP 154.03, 154.50, 154.82, 162.29, 164.23 164.53). Five sites within the ROW on the Umpqua and Rogue River national forests are also proposed to be impacted by the Project and avoidance of these sites would not be possible based on the steep slopes at those sites (MP 110.18, 153.90, 156.48, 156.89, and 164.69). Three locations within the

Winema National Forest are outside of the ROW, UCSAs and TEWAs, so direct impacts are not expected (MP 168.77 [2], 168.85).

Indirect effects are expected to the Siskiyou hesperian sites observed within the analysis area even where direct impacts to these sites are avoided. Construction of the Project would create an open corridor, which would be dominated by early seral vegetation for approximately 30 years. This is a long-term effect that could modify microclimate conditions around populations or individuals adjacent to the corridor during the early seral vegetation phase, and also result in changes in hydrology where vegetation is no longer present to stabilize soil and reduce the erosional effects of runoff. All the sites are within approximately 100 feet of Project disturbance, and thus would be affected by these changes in microclimate conditions and alterations in hydrology.

According to the Forest Service NRIS database, at least 39 Siskiyou hesperian sites are known from the three national forests crossed by the Project, including the 11 observations on the Rogue River National Forest and 1 site on the Umpqua National Forest observed during Project surveys (Yamamoto 2015b). An additional 8 sites were observed during Project surveys in 2014. Project surveys additionally identified 10 sites on BLM lands (SBS 2008, SBS 2011a: Roseburg and Medford BLM Districts, not discussed here); 55 sites are known from BLM land within the range of the NWFP. The Forest Service additionally described this species as very common throughout the High Cascades Ranger District. There are currently 63 observation points of Siskiyou hesperian that exist in NRIS from 2007-2011 project surveys, but not all have vouchers associated with them. It is additionally estimated that there are over 50 additional observations that have not been entered into NRIS, but also do not have vouchers associated with them (Yamamoto 2015b). However, this analysis conservatively assumes that the 102 confirmed sites comprise all existing Siskiyou hesperian sites.

Based on this information, the Project would affect approximately 18.6 percent of known sites (including indirect effects), although not likely affect site persistence at all these locations. The Project would affect the site persistence of approximately 10.8 percent of known sites. The sites documented during surveys for the Project as well as personal communication with the Forest Service (Yamamoto 2014, 2015b) indicate that this species may be more abundant and widely distributed than previously thought; however, until further surveys map additional Siskiyou hesperian occurrences, the documented occurrences are assumed to comprise all sites for this species.

Cumulative Effects

The Siskiyou hesperian cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 13). Habitat types preferred by the Siskiyou hesperian have been negatively impacted over the past 200 years. Development has concentrated around bodies of water, increasing disturbance and eliminating habitat. Riparian areas have been damaged and removed by timber clearing practices and conversion to other uses. Wetlands and wet meadows have been drained and trampled by grazing livestock. However, the NWFP has special land use allocations around

Riparian Reserves, streams, lakes, ponds, and wetlands that protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable Siskiyou hesperian habitat in Forest Service lands within the analysis area.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Project impacts would include habitat loss and modification, as well as potential mortality of individuals. However, Project impacts are not expected to affect species persistence as described above.

Proposed mitigation actions in the cumulative effects analysis area that would affect the Siskiyou hesperian include road decommissioning and riparian planting. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). There could be some negative short-term impacts of these actions, including disturbance and trampling of individuals during implementation. However, overall, these projects would benefit Siskiyou hesperian through habitat improvements and a reduction in disturbance over the long term. Decommissioning and planting of selected roads would reduce edge effects and fragmentation. Planting of riparian vegetation would also improve habitat quality for the Siskiyou hesperian at these sites. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Planned projects within cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). The planned projects would affect 13,026 acres, or 2.4 percent of the cumulative effects analysis area. Planned projects on the Umpqua National Forest include 14 projects within the Elk Creek, Upper Cow Creek and Trail Creek watersheds (Table 12). Forest Service projects include a weed treatment project, several timber treatments, a grazing allotment, a fuelbreak project, and various aquatic restoration projects; other projects include clearcutting on private lands, and a BLM timber sale and three forest management projects (Table 12). On the Rogue River National Forest, there are 12 planned projects within the Little Butte Watershed. Forest Service projects include 8 grazing allotments and one quarry (Table 12). On the Winema National Forest, there are 4 planned projects within the Spencer Creek Watershed that consist of a grazing allotment, road maintenance, a noxious weed treatment and a timber harvest project (Table 12).

The proposed grazing allotments could result in habitat destruction or modification, as well as trampling of individuals. The proposed timber projects could also result in impacts to habitat and individuals similar to those expected by the Project. The aquatic restoration projects would likely benefit the Siskiyou Hesperian by improving habitat.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions would contribute to the threats to this species from timber clearing and

grazing. However, Project mitigation would compensate for habitat loss and mortality of individuals during construction. Therefore, cumulative impacts on the Siskiyou hesperian are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through the NWFP Aquatic Conservation Strategy (see Appendices L, O and P of the BA).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals and habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Siskiyou hesperian because the proposed action would affect approximately 1 percent of potentially suitable available habitat within the analysis area, impact approximately 19 percent of the known sites (including indirect effects), and directly affect (eliminate) approximately 11 percent of known sites, although this species is likely more common than indicated by the NRIS database.

6.2.6.1 *Franklin's bumblebee (Bombus franklini)*

Species Status in the Project Area

Franklin's bumblebee is known only from southern Oregon and northern California between the Coast and Sierra-Cascade Ranges. In Oregon, this bumblebee is found in Douglas, Jackson, and Josephine counties. Franklin's bumblebee has the most restricted range of any bumblebee in the world. Its entire distribution can be covered by an oval of about 190 miles north to south and 70 miles east to west. As shown in Table 1, the species has been documented on the Umpqua and Rogue River national forests; it has not been documented and is not suspected to occur in the Winema National Forest. Franklin's bumblebee has been observed twice within 1-5 miles of the Project, once in the Umpqua and once in the Rogue River National Forest (Forest Service 2006, ORBIC 2012).

Franklin's bumblebee is associated with herbaceous grasslands that contain lakes, rivers, streams, and seeps because of the diversity and extended blooming period of wildflowers near these features (Black et al. 2009). Typically found between 1,400-4,000 foot elevations, this bumblebee requires a high amount of pollen and nectar sources such as plants in the genera

Lupinus, *Eschscholzia*, *Agastache*, *Monardella*, and *Vicia*. Nesting is completed underground in abandoned rodent and wildlife burrows (Thorp and Shepard 2005). The flight period is from May through early September (NatureServe 2013).

According to Black et al. (2009) and Thorp (2005) the major threats to the bumble bee are fire suppression, grazing, pesticides, and habitat fragmentation. In addition, exotic diseases introduced via trafficking in commercial bumblebee queens and nests for greenhouse pollination of tomatoes have caused losses. Because Franklin's bumblebees have such a limited range, areas where they have been known to occur are especially vulnerable.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Franklin's bumblebee habitat within 3,200 feet of the proposed action in the Umpqua and Rogue River national forests. Based on the habitat description above, we inferred that Franklin's bumblebee is associated the Westside Grasslands, Eastside Grasslands, and Herbaceous Wetlands Johnson and O'Neil (2001) habitat types, as shown below in Table 35, especially those that contain lakes, rivers, streams, and seeps. These associations likely overestimate suitable habitat as specific habitat information such proximity to waterbodies were not available. Additionally, delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate. Nonetheless, Table 35 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the Franklin's bumblebee.

Table 35. Franklin's Bumblebee Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Grasslands	Close	Feeds and Breeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Grasslands	Close	Feeds and Breeds	0.38	0.00	1 [3/]	63.03% [3/]
Herbaceous Wetlands	General		0.00	0.00	1	0.20%
Total			**2.92**	**0.32**	**12**	**35.24%**

1/ Totals taken from Table 6 for the Rogue River and Umpqua national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River and Umpqua national forests in which the species has been documented to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 35 percent of available potentially suitable habitat within the analysis area would be affected by the Project. However,

as discussed above, these calculations of potentially suitable habitat are likely overestimates as grassland habitat outside of the Project area was not fully delineated.

Direct mortality could occur during timber clearing, ROW and road construction if individuals are not able to get out of the way, although bumblebees are relatively mobile. Additionally, impacts could occur due to the loss of suitable habitat or as a result of habitat fragmentation. However, grassland habitats affected by the Project are expected to return pre-construction conditions more quickly than forested habitats, and could provide wildflower nectar sources, an important habitat component for the Franklin's bumblebee, relatively quickly following construction.

Application of herbicides during noxious weed treatments may have an indirect effect on Franklin's bumblebee by reducing nectar and pollen sources. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming and the selective use of herbicides[1]. Black et al. (2009) do not list herbicide application as a threat to bumblebees, although they note that herbicides can indirectly harm bumblebees by removing the flowers that would otherwise provide the bees with pollen and nectar (Williams 1986; Shepherd et al. 2003, Smallidge and Leopold 1997). However, herbicides would not be used in or within 100 feet of a waterbody's mean high water mark, unless allowed by the appropriate agency; as Franklin's bumblebees are associated with grasslands adjacent to waterbodies, removal of nectar sources by Project application of herbicides would be limited. Additionally, Black et al. (2009) lists invasive and introduced species as a threat to the Franklin's bumblebee because they compete with nectar sources, therefore selective use of herbicides greater than 100 feet from water may benefit the Franklin's bumblebee. Black et al. (2009) list pesticide application as a threat to Franklin's bumblebee; however, Pacific Connector has not proposed to use pesticides for the Project.

Cumulative Effects

The cumulative effects analysis area for the Franklin's bumblebee includes the fifth field watersheds crossed by the Project on the Rogue River and Umpqua national forests (Table 13). Major threats to this species are fire suppression, grazing, and habitat fragmentation (Black et al. 2009). Native grasslands are one of the most imperiled habitats in the western U.S., including Oregon (Vickery et al. 1999). In the Coast Range and West Cascades of Oregon, grassland loss since historical times is estimated at 99 percent (ODFW 2006). The reduction in the quality and quantity of grassland is due, in part, to over grazing, conversion to agriculture, human development, invasion by non-native plant species, and fire suppression. Sustainable grazing practices help maintain existing grasslands. Standards and guidelines within the NWFP limit livestock grazing and provide measures to minimize impacts from timber harvest. These habitat management practices would likely lead to improved quantity and quality of suitable habitat in NFS land within the analysis area.

[1] Pacific Connector would obtain applicable approvals or permits for use of herbicides on federal lands prior to use/treatment. Herbicides approved for use on NFS land include Chlorsulfuron, Glyphosate, Imazapyr, Metsulfuron methyl, Picloram, Sulfometuron methyl, Triclopyr, Sethoxydim, and Imazapic; see Pacific Connector's Integrated Pest Management Plan for details, Attachment 14 to the POD.

The Project would result in habitat loss and fragmentation as well as potential direct mortality to individuals during construction. However, as described above, impacts are expected to be short-term as the grassland habitats potentially occupied by Franklin's bumblebees would recover relatively quickly following construction. Construction of the pipeline and associated facilities would affect 1,950 acres within the cumulative effects analysis area, which is 0.4 percent of the total watershed area (Table 13). Approximately 15 percent of the Project ROW within the cumulative effects analysis area is currently non-forested; an additional 17 percent is currently forested, but would be maintained in an early seral stage following construction within the permanent 30-foot corridor, and thus could provide additional habitat for Franklin's bumblebee.

Proposed mitigation actions in the cumulative effects analysis area that would affect Franklin's bumblebee include fuels reduction, aquatic restoration, noxious weed treatment, and meadow habitat planting projects. Mitigation actions on federal lands would affect 7,337 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Fuels reduction projects could negatively affect Franklin's bumblebee if they result in greater fire suppression as fire contributes to maintaining open habitats such as the forest meadows used by Franklin's bumblebees. However, fuel treatments would also reduce the probability for stand-replacement fires that could remove bumblebee food sources. Projects that contribute to aquatic restoration such as road closure, decommissioning, and crossing repairs projects, would benefit Franklin's bumblebees by improving habitat quality. Noxious weed treatments would also benefit this species by removing invasive plant species that compete with preferred nectar sources. Additionally, meadow habitat planting designed to benefit other meadow species (Mardon skipper, short-horned grasshopper) within the ROW on 20 acres in the Rogue River National Forest could also benefit the Franklin's bumblebee. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). Forest Service projects include a weed treatment project, several timber treatments, grazing allotments, a fuelbreak project, and various aquatic restoration projects; other projects include clearcutting on private lands, and a BLM timber sale and three forest management projects (Table 12). The large number of thinnings combined with the aquatic habitat restoration would most likely contribute to the long term health of the ecosystem and thus benefit the Franklin's bumblebee. Meadow restoration planned on BLM lands as part of a forest management project could also improve habitat for Franklin's bumblebee. However, the timber sales, grazing allotments, and clearcuts could contribute to habitat alteration and disturbance within the vicinity of the proposed action. The fuel break would also contribute to fire suppression, which is listed as a threat to this species.

The proposed Project, including mitigation actions, would affect approximately 9,287 acres. Combined with 12,956 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,243 acres, or 4.5 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions would result in fire suppression, habitat fragmentation, and grazing, which are listed as threats to the species. However, Project mitigation and ROW restoration would

compensate for habitat loss and fragmentation, and mortality of individuals during construction. Therefore, cumulative impacts on the Franklin's bumblebee are expected to be insignificant, because the combined impacts to the 4.5 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize impacts include site restoration and habitat enhancements. Site restoration includes enhancement of soil productivity and noxious weed treatments. A native grass mix would be used to benefit federally-listed plant and insect species and may also provide food sources for the bumblebee (See Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through the NWFP Aquatic Conservation Strategy. Meadows and wetlands would be protected or enhanced with vegetation. Fuel treatments would reduce the probability for stand-replacement fires that could eradicate bumblebee food sources. Species-specific measures that enhance pollen sources for federally-listed butterflies may benefit bumblebees (see Appendices L, O and P of the BA).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Franklin's bumblebee since the proposed action would likely affect this species only indirectly, and could create additional suitable habitat for this species by clearing woody vegetation, replanting with native grass and forb species, and controlling potential invasion by noxious weeds post-construction.

6.2.6.2 *Western bumblebee (Bombus occidentalis)*

Species Status in the Project Area

Historical populations of western bumblebees used to cover much of the western U.S.; however, populations in central California, Oregon, Washington and southern British Columbia have mostly disappeared (Milliron 1971, Andrews 2010a). In Oregon and Washington, Western bumblebee populations are currently largely restricted to high elevation sites (Xerces Society 2012), and the species is no longer found in the western portions of either state where it was once common (Cameron et al. 2011). Despite being nearly extirpated in Oregon, this species has been documented on all three national forests crossed by the Project (Table 1; Thorp et al. 2008; Jepsen 2013). However, it is unknown what the current "Documented" status is for many of these field units, as many of the documented sites are considered historic (Jepsen 2013). Neither the Forest Service nor ORBIC location database records contained observations of the western bumblebee within 5 miles of the Project on NFS land (Forest Service 2006, ORBIC 2012).

Western bumblebees will visit a range of different plant species and are important generalist pollinators of a wide variety of flowering plants and crops (Goulson 2003, Heinrich 2004). Bumblebees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although

they are closely associated with areas that have continuously-blooming flowers throughout the year (Goulson 2010). Western bumblebees frequently nest in abandoned rodent burrows or bird nests. Queen production is dependent on access to sufficient quantities of pollen, so the amount of pollen available to bumblebee colonies directly affects the number of queens that can be produced (Burns 2004). Because queens are the only bumblebees capable of forming new colonies, pollen availability directly impacts future bumble bee population levels (Thorp et al. 2008). Western bumblebee nests have primarily been observed in underground cavities such as old squirrel or other animal nests and in open west-southwest slopes bordered by trees (Jepsen 2013). Very little is known about western bumblebee overwintering sites, although Hobbs (1968) reported western bumblebee overwintering sites that were two inches deep in a steep west slope.

Of the 15,573 bees sampled in extensive surveys throughout Oregon between 1998 and 2007, only 115 (less than 1 percent) were western bumblebees (Thorp et al. 2008). According to Jepsen (2013), the primary threats to the western bumblebee at the sites where it currently exists in Oregon and Washington include pathogens from commercial bumble bees and other sources, impacts from reduced genetic diversity, and habitat alterations including conifer encroachment (resulting from fire suppression), grazing, and timber clearing. Additional threats include pesticide use, fire, agricultural intensification, urban development and climate change (Jepsen 2013).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable western bumblebee habitat within 3,200 feet of the proposed action on the three national forests crossed by the Project. Based on the habitat description above, we inferred that the western bumblebee is closely and generally associated with the Johnson and O'Neil habitat types shown below. Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate. Nonetheless, Table 36 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the western bumblebee.

Table 36. Western Bumblebee Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Montane Mixed Conifer Forest	General		80.63	26.39	833	12.84%
Southwest Oregon Mixed Conifer-Hardwood Forest	General		312.20	93.17	11,980	3.38%

Table 36. Western Bumblebee Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Ponderosa Pine Forest and Woodlands	General		0.01	0.00	958	0.00%
Westside Oak and Dry Douglas-fir Forest and Woodlands	General		0.00	0.00	0	0.00%
Western Juniper and Mountain Mahogany Woodlands	General		0.00	0.00	0	0.00%
Shrub-steppe	General		6.75	0.62	9	79.64%
Westside Grasslands	Close	Feeds and Breeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Grasslands	Close	Feeds and Breeds	1.29	0.00	3 [3/]	50.41% [3/]
Herbaceous Wetland	Close	Feeds	0.00	0.00	28	0.01%
Westside Riparian Wetlands	General		0.08	0.00	40	0.20%
Eastside Riparian Wetlands	General		0.28	0.00	224	0.13%
Agriculture, Pastures and Mixed Environs	General	Feeds	0.00	0.00	0	0.00%
Roads	General		28.97	2.93	116	27.43%
Total			**432.75**	**123.44**	**14,202**	**3.92%**

1/ Totals taken from Table 6 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 4 percent of available potentially suitable habitat within the analysis area would be affected by the Project.

Direct impacts include construction-related activities that would impact individuals or destroy, alter, fragment, degrade or reduce the bumblebee's food supply, nesting habitat, or hibernation sites for overwintering queens (Andrews 2010a). Direct mortality could occur during clearing and construction if individuals are not able to get out of the way, although bumblebees are relatively mobile. Impacts could occur due to the loss of suitable habitat from Project activities such as road construction.

The Project could impact nest sites and overwintering sites during construction. Assuming that these sites would be primarily located in eastside and westside grassland habitats crossed by the Project, the Project would impact approximately 31 percent of nesting and overwintering habitat available within the analysis area (Table 36). However, as noted above, delineation of grassland habitat outside of Project impacts was limited so this the percentage of acres impacted is likely an overestimate. Additionally, no nest or hibernation sites have been documented within 5 miles of the Project. Although nest sites disturbed during construction would be negatively impacted, Project effects to nesting habitat would be temporary as the ROW would be restored following construction, and grassland habitats disturbed during construction would recover relatively quickly. Additionally, the Project could create additional suitable nesting habitat for this species by clearing woody vegetation, replanting with native grass and forb species, and controlling potential invasion by noxious weeds post-construction.

Application of herbicides during noxious weed treatments may have an indirect effect on nectar and pollen sources. As described above under Franklin's bumblebee, vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming and the selective use of herbicides[2]. Project herbicide application could reduce available floral sources for bumblebees, which Jepsen (2013) lists as a serious threat. However, herbicides would only be used where they are most appropriate treatment method, and would be applied using spot treatments to minimize impact to native or non-target species. Additionally, in non-forested areas Pacific Connector would revegetate the ROW following construction to approximate the original pre-disturbed condition. Jepsen (2013) also lists pesticide application as a direct threat to western bumblebee; however, Pacific Connector has not proposed to use pesticides for the Project.

Cumulative Effects

The Western bumblebee cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Winema, and Umpqua national forests (Table 13). Major threats to this species include habitat alteration, broad-spectrum herbicides, and invasive plants. Native grasslands are one of the most imperiled habitats in the western U.S., including Oregon, due to conversion to agriculture, development, invasion by non-native plant species, and fire suppression. In the Coast Range and West Cascades of Oregon, grassland loss since historical times is estimated at 99 percent (ODFW 2006). As the habitat becomes more fragmented the genetic diversity decreases due to inbreeding which in turn causes an increase in the risk of population declines. Grazing livestock also negatively affects bumblebee populations by altering the vegetation community, disturbing nest sites, and removing flowering food sources. Standards and guidelines within the NWFP provide measures to minimize

[2] Pacific Connector would obtain applicable approvals or permits for use of herbicides on federal lands prior to use/treatment. Herbicides approved for use on NFS land include Chlorsulfuron, Glyphosate, Imazapyr, Metsulfuron methyl, Picloram, Sulfometuron methyl, Triclopyr, Sethoxydim, and Imazapic; see Pacific Connector's Integrated Pest Management Plan for details, Attachment 14 to the POD.

impacts from timber harvest. These habitat management practices would likely lead to improved quantity and quality of suitable habitat on NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). The Project would result in habitat alteration as well as potential direct mortality to individuals during construction. However, as described above, impacts are expected to be short-term as the grassland habitats potentially occupied by Western bumblebees would recover relatively quickly following construction. Approximately 13 percent of the Project ROW within the cumulative effects analysis area is currently non-forested; an additional 18 percent is currently forested, but would be maintained in an early seral stage following construction within the permanent 30-foot corridor, and thus could provide additional habitat for the Western bumblebee.

Proposed mitigation actions in the cumulative effects analysis area that would affect the Western bumblebee include fuels reduction, noxious weed treatment, and meadow habitat planting projects. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). Fuels reduction projects could negatively affect the Western bumblebee by allowing conifer encroachment, which is listed as a threat to this species. However, fuel treatments would also reduce the probability for stand-replacement fires that could remove bumblebee food sources. Noxious weed treatments would benefit this species by removing invasive plant species that compete with preferred nectar sources. Additionally, meadow habitat planting designed to benefit other meadow species (Mardon skipper, short-horned grasshopper) within the ROW on 20 acres in the Rogue River National Forest could also benefit the Western bumblebee. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). The planned projects would affect 13,026 acres, or 2.4 percent of the cumulative effects analysis area. Forest Service projects include noxious weed treatment projects, several timber treatments, grazing allotments, and a fuelbreak project; other projects include clearcutting on private lands, and a BLM timber sale forest management projects (Table 12). The large number of thinnings would most likely contribute to the long term health of the ecosystem. Meadow restoration planned on BLM lands as part of a forest management project could also improve habitat for Western bumblebee. However, the timber sales, grazing allotments, and clearcuts could contribute to habitat alteration and disturbance within the vicinity of the proposed action.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions could result in conifer encroachment, habitat alteration, and grazing, which are listed as threats to the species. However, Project mitigation and ROW restoration would compensate for habitat alteration. Therefore, cumulative impacts on the Western bumblebee are

expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize impacts include site restoration and habitat enhancement measures (See Appendix N of the BA). Site restoration includes enhancement of soil productivity and noxious weed treatments. A native grass mix would be used to benefit federally-listed plant and insect species and may also provide food sources for the bumblebee. For a full discussion of conservation plans that promote grassland and insect habitat see Appendix O of the BA.

As part of the CMP, Riparian Reserves would be restored or maintained through the NWFP Aquatic Conservation Strategy. Meadows and wetlands would be protected, or enhanced with vegetation. Species-specific measures that enhance pollen sources for federally-listed butterflies may benefit bumblebees (see Appendices L, O and P of the BA).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the western bumblebee because the proposed Project would affect only approximately 4 percent of available suitable habitat for this species within the analysis area.

6.2.6.3 *Siskiyou short-horned grasshopper (Chloealtis aspasma)*

Species Status in the Project Area

Siskiyou short-horned grasshoppers are distributed in two general areas: the Siskiyou and Cascade mountain ranges in Jackson County in southwestern Oregon, and Benton County in west-central Oregon. As shown in Table 1, the species is suspected to occur in the Umpqua National Forest and has been documented at Dead Indian Plateau in the Rogue River National Forest; it has not been documented and is not suspected to occur in the Winema National Forest. There is one documented observation of the Siskiyou short-horned grasshopper within 1 mile of the Project on the Rogue River National Forest (Forest Service 2006, ORBIC 2012).

This grasshopper lives in grasslands and is dependent upon elderberry for egg-laying. It is active July through September. This species has also been observed in clearings created by old clearcuts and vegetated with grasses, forbs, and elderberry, and on the brushy edges of clearcuts (Foster 1974). It is known to occur in Jackson County, Oregon at elevations between 5,000 and 5,800 feet. The closely related species *C. conspersa* feeds primarily on grasses and to a lesser extent on forbs (Gangwere 1961); Siskiyou short-horned grasshoppers may exhibit similar feeding behavior.

Threats to this species include the loss of open meadows at higher elevations which can lead to the elimination of habitat for the host plant (Brenner 2006). Sources of meadow loss include fire prevention and restricted timber clearing (Brenner 2006). Other threats include birds, which may

feed on the juveniles and adults, and the predator *Goniopsita oophaga* whose larvae infest egg pods (Brenner 2006).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes grassland and herbaceous habitat within 3,200 feet of the proposed action in the Rogue River and Umpqua national forests. Based on the habitat description above, we inferred that the Siskiyou short-horned grasshopper is associated with the Westside Grasslands, Eastside Grasslands, and Herbaceous Wetlands Johnson and O'Neil (2001) habitat types, as shown below. Table 37 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the Siskiyou short-horned grasshopper.

Table 37. Siskiyou Short-horned Grasshopper Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Grasslands	Close	Feeds and Breeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Grasslands	Close	Feeds and Breeds	0.38	0.00	1 [3/]	63.03% [3/]
Herbaceous Wetland	General	Feeds and Breeds	0.00	0.00	1	0.20%
Total			**2.92**	**0.32**	**12**	**26.49%**

1/ Totals taken from Table 6 for the Rogue River and Umpqua national forests in which the species has been documented or is suspected to occur.
2/ Totals taken from Table 3 for the Rogue River and Umpqua national forests in which the species has been documented or is suspected to occur; does not include habitat located in the Winema National Forest or on other federal or non-federal lands
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 26 percent of available potentially suitable habitat within the analysis area would be affected by the Project. Impacts would include loss of elderberry plants used for breeding, and loss of forage species. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates as grassland habitat outside of the Project area was not fully delineated. Additionally, this species has been documented in clear-cuts, and timber clearing appears to provide open habitat for the host plant, blue elderberry, thereby increasing local populations of Siskiyou short-horned grasshoppers (Brenner 2006). As a result, removal of woody vegetation by the Project, and maintenance of the ROW in an early seral stage could create habitat for this species.

Direct mortality could occur during clearing and construction if individuals are not able to get out of the way, although grasshoppers are relatively mobile. Plants containing eggs could also be destroyed. Although elderberry trees containing eggs disturbed during construction would be

negatively impacted, Project effects to breeding and foraging habitat would be temporary as the ROW would be restored following construction, and grassland habitats disturbed during construction would recover relatively quickly. Additionally, meadow restoration and elderberry plantings as described below under Conservation Measures and Mitigation would benefit the Siskiyou short-horned grasshopper.

Cumulative Effects

The short-horned grasshopper cumulative effects analysis area includes the fifth field watersheds crossed by the Project in the Umpqua and Rogue River national forests (Table 13). A major threat to this species is restricted timber clearing or fire prevention that lead to the loss of open habitat at high elevations (Brenner 2006). Other threats include removal of host plants by livestock and predation by other insects and birds. Under the NWFP, LSRs in the area are likely to improve habitat for this species with the maintenance of forest gaps and frequency of low-intensity fire. Meadows are further protected under the NWFP through measures that conserve great gray owl habitat by prohibiting tree-clearing within 300 feet of a meadow's edge. In addition, standards and guidelines within the NWFP limit livestock grazing around aquatic areas. These actions would likely lead to improved quantity and quality of suitable habitat on Forest Service lands within the analysis area.

Construction of the pipeline and associated facilities would affect 1,950 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). As described above, Project impacts would include loss of elderberry plants used for breeding, and loss of forage species. However, removal of woody vegetation by the Project, and maintenance of the ROW in an early seral stage could create habitat for this species. Within the Rogue River and Umpqua national forests, 83 acres (17 percent) of the ROW is currently forested, but would be maintained in an early seral stage within the 30-foot permanent corridor.

Proposed mitigation actions in the cumulative effects analysis area that would affect the short-horned grasshopper include fuels reduction and meadow habitat planting projects. Mitigation actions on federal lands would affect 7,337 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Fuels reduction projects could negatively affect the short-horned grasshopper by contributing to fire prevention, which can result in loss of meadow habitat and is listed as a threat to this species. However, approximately 20 acres of elderberry, the species' host plant, would be planted within the ROW near a known population on the Dead Indian Plateau, within the Rogue River National Forest, resulting in habitat creation. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Within the cumulative effects analysis area planned projects include livestock grazing allotments, timber thinning projects, BLM forest management projects, and anticipated clearcutting on private land. Livestock grazing and timber thinning could negatively affect the Siskiyou short-horned grasshopper and its habitat in a similar fashion as the Project by preventing fire and disturbing individuals and habitat. Clearcutting could benefit the Siskiyou short-horned grasshopper by creating openings where elderberries may establish.

The proposed Project, including mitigation actions, would affect approximately 9,287 acres. Combined with 12,956 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,243 acres, or 4.5 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions could result in meadow habitat loss through fire prevention which is listed as a threat to this species. However, clearing of the ROW as well as planned clearcutting would create habitat for the Siskiyou short-horned grasshopper. Therefore, cumulative impacts on the Siskiyou short-horned grasshopper are expected to be insignificant, because the combined impacts to the 4.5 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize project-related impacts and reestablish grassland vegetation are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), and the Erosion Control and Revegetation Plan (Appendix F of the BA).

Specific mitigation measures developed to benefit the Siskiyou short-horned grasshopper are described in the CMP (see Appendix O of the BA). Approximately 20 acres of elderberry, the species' host plant, would be planted within the ROW near a known population on the Dead Indian Plateau, within the Rogue River National Forest. Additionally, Pacific Connector has an Agreement in Principle with the Forest Service which includes 125.3 acres of meadow restoration on the Umpqua National Forest within the Elk Creek and Days Creek South Umpqua River watershed that would benefit native species including the Siskiyou short-horned grasshopper (FERC 2015). For a full discussion of measures that would promote grassland and insect habitat see Appendix O of the BA.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Siskiyou short-horned grasshopper because only approximately 3 acres of suitable habitat would be impacted, and approximately 20 acres of the ROW would be planted with elderberry, creating suitable habitat near a known population. Additionally, the proposed Project could create additional suitable habitat for this species by clearing woody vegetation, replanting with native grass and forb species, and controlling potential invasion by noxious weeds post-construction throughout the ROW.

6.2.6.4 *Gray-blue butterfly (Plebejus podarce klamathensis)*

Species Status in the Project Area

The gray-blue butterfly is found in the southern Cascades and eastern Siskiyou Mountains located in Douglas, Jackson, and Klamath counties (Pyle 2002). As shown in Table 1, the

species has been documented in all three national forests crossed by the Project. There has been one documented observation of the gray-blue butterfly within 1-5 miles of the Project on the Winema National Forest; there are no documented observations of the species within 5 miles of the Project on the Rogue River or the Umpqua national forests (Forest Service 2006, ORBIC 2012).

Appropriate habitat includes marshy slopes and meadows that contain deep grasses and dense stands of false hellebore (*Veratrum viride*; Dornfeld 1980). The species has been recorded at high elevation wet montane meadows from 5,100 ft. to over 6,500 feet. Adults typically begin to fly during June at lower elevations and continue through September at higher elevations. The larval food plant in Oregon has not been reported, but shooting stars (*Dodecatheon jeffreyi* and *D. alpinum*) are the larval food plant in the Trinity and Sierra Nevada mountains, California (Pyle 2002, Warren 2005). Adults typically feed on yellow flowers in the composite family (NatureServe 2013). Adults are very local and do not appear to wander much beyond their meadow habitat (Opler and Wright 1999).

Threats to the limited high elevation habitat the species depends on include succession, impacts from grazing and recreation, or desiccation due to water diversions (Opler et al. 2006). Succession may include the encroachment of trees or woody shrubs that out compete native food plants. Grazing and recreation may trample or remove food plants while impacts to hydrology may influence moisture regimes and the abundance of native plants.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable gray-blue butterfly habitat within 3,200 feet of the proposed action on the Rogue River and Winema national forests. Although this species has been documented on the Umpqua National Forest, the Project does not cross the Umpqua National Forest within the suspected distribution of the species (Jordan 2009); therefore no impacts are expected within the Umpqua National Forest and it is not included in this analysis.

Based on the habitat description above, we inferred that the gray-blue butterfly is associated the Westside Grasslands, Eastside Grasslands, and Herbaceous Wetlands Johnson and O'Neil (2001) habitat types, as shown below. Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate. Nonetheless, Table 38 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the gray-blue butterfly.

Table 38. Gray-blue Butterfly Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Grasslands	Close	Feeds and Breeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Grasslands	Close	Feeds and Breeds	1.29	0.00	3 [3/]	50.41% [3/]
Herbaceous Wetland	Close	Feeds and Breeds	0.00	0.00	27	0.00%
Total			**3.82**	**0.33**	**41**	**10.24%**

1/ Totals taken from Table 6 for the Rogue River and Winema national forests in which the species has been documented to occur. Totals do not include the Umpqua National Forest because the proposed action does not cross the Umpqua National Forest within the range of the species.
2/ Totals taken from Table 3 for the Rogue River and Winema national forests in which the species has been documented to occur. Totals do not include the Umpqua National Forest because the proposed action does not cross the Umpqua National Forest within the range of the species.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 4 acres, or 10 percent of available potentially suitable habitat within the analysis area would be affected by the Project; all three habitat types identified are assumed to be used by the gray-blue butterfly for feeding and breeding.

Direct mortality could occur to this species if individuals are located within the ROW during Project clearing or construction, including mortality of eggs, caterpillars, and nectaring adults, although adults would likely be able to fly out of the way of construction equipment. Another potential direct effect is destruction or alteration of the high elevation wetland and meadow habitats used by this species. However, these habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition. As described in Pacific Connector's Erosion Control and Revegetation Plan (Appendix F of the BA), all graded areas associated with pipeline construction would be regraded and recontoured as feasible to blend into the surrounding landscape and to reestablish natural drainage patterns. This would minimize changes in hydrology, which is listed as a threat to this species. Pacific Connector would also mitigate soil compaction during ROW restoration by regrading, recontouring, and scarifying compacted areas. These actions would promote infiltration, reduce surface water runoff, minimize erosion, and enhance revegetation efforts.

Indirect effects could result from the alteration of composition and structure of food plants resulting from changes in hydrology or soil compaction. However, as described above, changes in hydrology and soil compaction would be minimized following construction, and the ROW would be reseeded using an appropriate seed mix, which would minimize the loss of food plants in the long term. Therefore, although the Project could result in some impacts to individuals and habitat, considering site restoration measures designed to minimize compaction and changes in

hydrology, and promote revegetation, the Project is not expected to result in a loss of viability for this species.

Cumulative Effects

The cumulative effects analysis area for the gray-blue butterfly includes the fifth field watersheds crossed by the Project on the Rogue River and Winema national forests (Table 13). Habitat types preferred by the gray-blue butterfly have been negatively impacted over the past 200 years. Development has concentrated around bodies of water, increasing disturbance and eliminating habitat. Wetlands and wet meadows have been drained and trampled by grazing livestock. However, the NWFP has special land use allocations around riparian areas, streams, lakes, ponds, and wetlands that protect these resources. Wetlands are often associated with meadows, another habitat component for blue-gray butterflies. Meadows are further protected under the NWFP through measures that conserve great gray owl habitat by prohibiting tree-clearing within 300 feet of a meadow's edge. In addition, standards and guidelines within the NWFP limit livestock grazing around aquatic areas. These actions would likely lead to improved quantity and quality of suitable blue-gray butterfly habitat on NFS land within the analysis area.

Construction of the pipeline and associated facilities would affect 962 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 13). The Project would result in habitat modification as well as potential direct mortality to individuals during construction. However, as described above, effects would be short term because meadow habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition.

Mitigation actions on federal lands would affect 1,100 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 13). However, the only proposed mitigation actions in the cumulative effects analysis area with the potential to affect the gray-blue butterfly is the meadow habitat planting project described above for the Siskiyou short-horned grasshopper. This meadow habitat planting designed to benefit other meadow species (Mardon skipper, short-horned grasshopper) within the ROW on 20 acres in the Rogue River National Forest could also benefit the gray-blue butterfly.

Planned projects within watersheds where the proposed action crosses the Rogue River and Winema national forests include a variety of timber, grazing and biological projects (Table 12). On the Rogue River National Forest, there are 12 planned projects within the Little Butte Watershed. Forest service projects include 8 livestock grazing allotments; other projects include three BLM forest management projects(Table 12). On the Winema National Forest, there are 4 planned projects within the Spencer Creek Watershed that consist of a livestock grazing allotment, road maintenance, a noxious weed treatment and a timber harvest project (Table 12). The thinnings and noxious weed treatment would most likely contribute to the long term health of the ecosystem. However, the timber sales, grazing allotments, and clearcuts could contribute to habitat alteration and disturbance within the vicinity of the proposed Project, especially where the livestock grazing tramples food plants and alters hydrology by compacting soil at high elevation wet meadows.

The proposed Project, including mitigation actions, would affect approximately 2,062 acres. Combined with 3,782 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 5,844 acres, or 1.7 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions could contribute to forest succession and impacts from grazing, which are listed as threats to the species (Opler et al. 2006). However, meadow habitat planting and ROW restoration would mitigate these effects. Therefore, cumulative impacts on the gray-blue butterfly are expected to be insignificant, because the combined impacts to the 1.7 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts and promote meadow habitat are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), and the Erosion Control and Revegetation Plan (Appendix F of the BA). Specific measures that would minimize impacts include site restoration and habitat enhancement measures as described above and discussed in the CMP (see Appendix O of the BA). A native grass mix would be used to benefit federally-listed plant species and may also provide suitable habitat for the butterfly.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the gray-blue butterfly because the proposed Project would affect only approximately 4 acres of potentially suitable habitat, and would restore the ROW to pre-disturbance conditions following construction.

6.2.6.1 *Johnson's hairstreak (Callophrys johnsoni)*

Species Status in the Project Area

The Johnson's hairstreak butterfly is found on Pacific-sloped mountains from British Columbia south to central California. In Oregon, populations have been found on the west side of the southern Cascade Mountains. In western Oregon, the species occupies a wide range of elevations, between 500 to over 5,000 feet (Warren 2005). There are 121 sites in Oregon and Washington and an undisclosed number of sites on NFS land (Andrews 2010b, Davis and Weaver 2011, Stone et al. 2011). As shown in Table 1, the species has been documented in all three national forests crossed by the Project. Neither the Forest Service nor ORBIC location database records contained observations of the Johnson's hairstreak butterfly within 5 miles of the Project on NFS lands (Forest Service 2006, ORBIC 2012).

Larsen et al. (1995) states that old-growth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where mistletoe (*Arceuthobium* spp.)

is present also supports populations. The most important habitat features to predict moderate to high abundance is the presence of its host larval plant, pine dwarf mistletoe (Davis 2009). The butterfly can occur in western hemlock (*Tsuga heterophyla*), ponderosa pine (*Pinus ponderosa*) or white fir (*Abies concolor*) forests that are infected with mistletoe (Davis 2009). Once hatched, caterpillars feed on the host plant (Opler et al. 2006). Caterpillars can be found on host leaves April to October (Allen et al. 2005). Adults fly from mid-May to early September with peaks occurring in May and August (Pyle 2002, Davis 2009). Adult food plants include nectar from genera *Actostophylos, Ceanothus, Cornus, Fragaria, Rorippa, Spraguea,* and *Taraxacum* (Andrews 2010b).

Threats to the species are not fully understood but timber harvest and clearing, particularly involving stands that contain larval plants, is assumed to be the primary threat (Andrews 2010b). Additional threats may include the aerial broadcast of the bacteria *Bacillus thuringiensis kurstaki* to control spruce budworm outbreaks, although it is not know to what extent. Finally, herbicides may remove nectar plants which may affect individuals (Andrews 2010b).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes coniferous forests within 3,200 feet of the proposed action on the three national forests crossed by the Project. Based on the habitat description above, we inferred that Johnson's hairstreak is closely and generally associated with the Johnson and O'Neil (2001) habitat types shown below, especially where its host larval plant, pine dwarf mistletoe, is present. Table 39 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the Johnson's hairstreak.

Table 39. Johnson's Hairstreak Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside-Lowland Conifer-Hardwood-Forest	General	Feeds and breeds	0.00	0.00	0	0.00%
Montane Mixed Conifer Forest	General	Feeds and breeds	80.63	26.39	833	12.84%
Southwest Oregon Mixed Conifer-Hardwood Forest	General	Feeds and breeds	312.20	93.17	11,980	3.38%
Ponderosa Pine Forest and Woodlands	General	Feeds and breeds	0.01	0.00	958	0.00%

Table 39. Johnson's Hairstreak Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Westside Oak and Dry Douglas-fir Forest and Woodlands	General	Feeds and breeds	0.00	0.00	0	0.00%
Total			**392.84**	**119.56**	**13,771**	**3.72%**

1/ Totals taken from Table 6 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented to occur.

Based on these habitat association assumptions, approximately 4 percent of available potentially suitable habitat within the analysis area would be affected by the Project.

This species could be negatively impacted by the Project by the clearing of mistletoe host trees containing eggs or larvae and by alteration of habitat which could impact adult food plants and remove potential host trees, all of which are listed as current threats to this species (Andrews 2010b). Pacific Connector's removal of timber outside of the core migratory bird breeding season (April 1 -July 15) would minimize the potential for the removal of host trees containing eggs or larvae; however, eggs could be present and cleared before this period, and larvae remaining after this period could be killed. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. However, the Project would only affect approximately 4 percent of habitat available within the analysis area. Additionally, impacts to old-growth and late successional forests that provide the best habitat for this butterfly have been minimized where feasible, and compensatory mitigation proposed to offset impacts to NSO and marbled murrelet habitat may benefit the Johnson's hairstreak by creating and protecting old-growth and late successional forests, as described in the CMP (Appendix O of the BA).

Application of herbicides during noxious weed treatments may also have an indirect effect on the species by removing nectar sources. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming and the selective use of herbicides[3]. Project herbicide application could reduce available floral sources for the Johnson's hairstreak, which Andrews (2010b) lists as a threat. However, herbicides would only be used where they are most appropriate treatment method, and would be applied using spot treatments to minimize impact to native or non-target species. The Project would not contribute to the third threat listed

[3] Pacific Connector would obtain applicable approvals or permits for use of herbicides on federal lands prior to use/treatment. Herbicides approved for use on NFS land include Chlorsulfuron, Glyphosate, Imazapyr, Metsulfuron methyl, Picloram, Sulfometuron methyl, Triclopyr, Sethoxydim, and Imazapic; see Pacific Connector's Integrated Pest Management Plan for details, Attachment 14 to the POD.

above, application of the bacterium *Bacillus thuringiensis kurstaki* to control spruce budworm outbreaks.

Cumulative Effects

The Johnson's hairstreak cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River, Umpqua, and Winema national forests (Table 13).The primary threat to Johnson's hairstreak is timber harvest and clearing. Over the past 200 years, timber clearing has dramatically decreased late successional and old-growth forest habitats in Oregon upon which the Johnson's hairstreak depends. Compared to historical times, only eight percent of this habitat type remains in the Coast Range of Oregon, 23 percent in the West Cascades, and 25 percent in the Klamath Mountains province (ODFW 2006). The NWFP designates late successional and old-growth forests on federal lands as protected areas and manage them for optimal habitat characteristics. Because the larval host plant is associated with late-seral and old growth habitat, management under the NWFP would maintain or potentially increase the quality and quantity of Johnson's hairstreak habitat in the future.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Project impacts would include habitat destruction, as well as potential effects from herbicide use. However, impacts to old-growth and late successional forests that provide the best habitat for this butterfly have been minimized where feasible, and compensatory mitigation proposed to offset impacts to NSO and marbled murrelet habitat may benefit the Johnson's hairstreak by creating and protecting old-growth and late successional forests, as described in the CMP (Appendix O of the BA).

Proposed mitigation actions in the cumulative effects analysis area include reallocation of Matrix to LSR, road decommissioning, and pre-commercial thinning. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). There could be some negative short-term impacts of these actions, including disturbance during implementation and potential removal of the host larval plant, pine dwarf mistletoe. However, overall, these projects would benefit the Johnson's hairstreak through habitat improvements and a reduction in disturbance over the long term. Reallocation of Matrix to LSR would offset the long-term loss of LSR acres, and thus ensure future availability of late-successional habitat. Decommissioning and planting of selected roads in conjunction with pre-commercial thinning treatments would block up forested habitat and reduce edge effects and fragmentation in a period of about 40 years. Density management of forested stands would assist in the recovery of late-seral habitat, reduce impacts from fragmentation, reduce edge effects, and enhance resilience of mature stands, all of which would benefit this late-successional associated species. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Planned projects within the cumulative effects analysis area that could affect the Johnson's hairstreak include a variety of timber projects. Forest Service projects include several timber treatments; other projects include clearcutting on private lands, and a BLM timber sale and

forest management projects (Table 12). Most of these projects would contribute to the assumed primary threat to this species, timber harvest and clearing, however the thinning and fuel reduction actions planned as part of the BLM forest management projects would improve habitat for Johnson's hairstreak (Andrews 2010b).

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions would contribute to the threats to this species from timber harvest and clearing. However, Project mitigation would compensate for habitat loss. Therefore, cumulative impacts on the Johnson's hairstreak are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), and the Erosion Control and Revegetation Plan (Appendix F of the BA).

The Forest Service proposed re-allocation of nearly 1,200 acres of forested lands from matrix to LSR allocation would benefit Johnson's hairstreak over time by providing additional habitat that is managed to create late successional–old growth stand conditions. Details on this compensatory mitigation can be found in the CMP (Appendix O of the BA).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Johnson's hairstreak butterfly since the proposed Project would affect only 4 percent of available potentially suitable habitat for this species within the analysis area, and compensatory mitigation proposed for impacts to the NSO and marbled murrelet would also benefit Johnson's hairstreak.

6.2.6.2 *Mardon skipper (Polites mardon)*

Species Status in the Project Area

This butterfly species' distribution is limited to sites located in the southern Puget Sound of Washington, the Mt. Adams area in southern Washington, the north coast of California, and the Cascade Range in southern Oregon. Many seemingly suitable habitats within the Cascade Range are currently unoccupied (NatureServe 2013). Within Oregon, the Mardon skipper can be found in Jackson and Klamath Counties. As shown in Table 1, the species is suspected to occur in the Umpqua National Forest and has been documented in the Rogue River and Winema national forests. The Mardon skipper has been observed once within 1 mile and twice

within 1-5 miles of the Project in the Rogue River National Forest; there are no documented observations of the species within 5 miles of the Project in the Winema or the Umpqua National Forest (Forest Service 2006, ORBIC 2012).

The Mardon skipper is a small butterfly that inhabits grassland and meadow habitats dominated by fescue grasses (*Festuca* spp.). They complete one life cycle annually, with adults emerging from their chrysalis in late spring or early summer. Following mating, females deposit their eggs onto the stalks of fescue. The eggs hatch after 6 to 7 days, after which the larva feeds on fescue grasses for about 3 months before hibernating through the winter and spring as a pupa (Black and Vaughan 2005). Adults feed on the nectar of a variety of plants including blue violet (*Viola adunca*), lupine (*Lupinus* spp.), Idaho blue-eyed grass (*Sisyrinchium idahoense*), penstemon (*Penstemon* spp.), western wallflower (*Erysimum capitatum*), and clover; Scotch broom (*Cytisus scoparius*) is strongly avoided. Very little movement between populations or suitable habitat is believed to occur due to the Mardon skipper's inability to traverse through unsuitable habitat such as closed woodlands and shrub thickets (Black and Vaughan 2005). Most sites support less than fifty butterflies, while none support more than a few hundred (Black and Vaughan 2005).

The Mardon skipper is a U.S. Fish and Wildlife Service candidate species considered for listing under the ESA (ORBIC 2013; 64 FR 57539). Threats to Mardon skipper include direct impacts to eggs, larvae and pupae by unregulated off-road vehicle use, livestock grazing, and application of *Bacillus thuringiensis kurstaki*, used to control spruce budworm outbreaks (Kerwin 2011). Habitat loss or modification through conifer encroachment, noxious weed invasion, roadside maintenance, and grassland/meadow management activities such as prescribed burning and mowing are also threats (Kerwin 2011). Stochastic events and climate change also threaten this species (Kerwin 2011).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable mardon skipper habitat within 3,200 feet of the proposed action in the three national forests crossed by the Project. Based on the habitat description above, we inferred that the mardon skipper is associated the Westside Grasslands and Eastside Grasslands Johnson and O'Neil (2001) habitat types, as shown below. Table 40 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the mardon skipper.

Table 40. Mardon Skipper Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Grasslands	Close	Feeds and Breeds	2.53	0.32	11 [3/]	26.74% [3/]
Eastside Grasslands	Close	Feeds and Breeds	1.29	0.00	3 [3/]	50.41% [3/]
Total			**3.82**	**0.33**	**13**	**31.34%**

1/ Totals taken from Table 6 for the Rogue River, Winema, and Umpqua national forests in which the species has been documented or is suspected to occur.
2/ Totals taken from Table 3 for the Rogue River, Winema and Umpqua national forests in which the species has been documented or is suspected to occur; does not include habitat located on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 4 acres, or 31 percent of available potentially suitable habitat within the analysis area would be affected by the Project. However, as discussed above, these calculations of potentially suitable habitat are likely overestimates as grassland habitat outside of the Project area was not fully delineated.

Pipeline construction could directly affect the Mardon skipper by increasing invasion by exotic plant species, impacting grassland habitat, or by direct mortality or disturbance during construction activities, all of which Kerwin (2011) lists as threats to this species. Eggs or pupae could also be destroyed during vegetation removal. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. However, these habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition, and would be replanted with appropriate seed mixes to prevent noxious weed germination. Additionally, after construction, the ROW would be monitored and any noxious weed infestations would be controlled as described in Pacific Connector's Integrated Pest Management Plan (Attachment 14 to the POD).

The Forest Service has identified a specific on-site mitigation measure within the Rogue River National Forest that would benefit the Mardon skipper. Approximately 20 acres of the ROW near a known population on the Dead Indian Plateau would be restored with grasses (including *Festuca* sp.) preferred by the Mardon skipper in addition to the rehabilitation required under best management practices guidelines. Planting grass species preferred by the Mardon skipper would result in the creation of habitat along the permanent open corridor created by the Project, and would immediately benefit the known population at that location. Therefore, although the Project could result in some impacts to individuals and habitat, considering site restoration measures designed to promote revegetation with desirable species and prevent the spread of noxious weeds, the Project is not expected to result in a loss of viability for this species.

Cumulative Effects

The mardon skipper cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Winema and Rogue River national forests (Table 13). Native

grasslands are one of the most imperiled habitats in the western U.S., including Oregon, due to conversion to agriculture, development, invasion by non-native plant species, and fire suppression. In the Coast Range and West Cascades of Oregon, grassland loss since historical times is estimated at 99 percent (ODFW 2006). Sustainable grazing practices help maintain existing grasslands. Noxious weed treatments promote native vegetation and may benefit native grasslands and pastures.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). As described above, Project impacts would include habitat modification as well as potential mortality of individuals during construction. However, removal of woody vegetation by the Project and maintenance of the ROW in an early seral stage could create habitat for this species, and post-construction restoration would prevent noxious weeds from establishing. Within the Rogue River and Umpqua national forests, 83 acres (17 percent) of the ROW is currently forested, but would be maintained in an early seral stage within the 30-foot permanent corridor.

Proposed mitigation actions in the cumulative effects analysis area that would affect the mardon skipper include fuels reduction and meadow habitat planting projects. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). Fuels reduction projects could negatively affect the mardon skipper by contributing to fire prevention, which could result in conifer encroachment which is listed as a threat to this species. However, within the Rogue River National Forest approximately 20 acres of the ROW near a known population on the Dead Indian Plateau would be planted with species preferred by the mardon skipper, resulting in habitat creation. These proposed mitigation projects are described in detail in Appendix F of the FEIS (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). Forest Service projects include a weed treatment project, several timber treatments, a grazing allotment, and a fuelbreak project; other projects include clearcutting on private lands, and a BLM timber sale and forest management projects (Table 12). The noxious weed treatments would benefit the mardon skipper by reducing the threat of noxious weed invasion, and meadow restoration planned on BLM lands as part of a forest management project could also improve habitat for Mardon skipper. However, the timber sales, livestock grazing allotments, and clearcuts could contribute to habitat alteration and trampling of individuals within the vicinity of the proposed Project.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions could result in meadow habitat loss through fire prevention and the associated conifer encroachment, and trampling of individuals during livestock grazing; both are listed as a threat to this species. However, clearing of the ROW and restoration following construction would create habitat for the mardon skipper. Therefore, cumulative impacts on the

mardon skipper are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would minimize Project-related impacts include revegetating and reseeding the ROW using native vegetation, avoiding soil compaction by performing construction during dry periods (May-October) and potentially using helicopters in rugged terrain, and controlling for invasive species after construction (see Appendix N of the BA).

As discussed above, approximately 20 acres of the ROW near a known population on the Dead Indian Plateau would be restored with grasses (including *Festuca* sp.) preferred by the Mardon skipper in addition to the rehabilitation required under best management practices guidelines. An additional 120 acres in the Umpqua National Forest would be treated for noxious weeds and encroaching conifer trees and planted with native vegetation. Additionally, Pacific Connector has an Agreement in Principle with the Forest Service which includes 125.3 acres of meadow restoration on the Umpqua National Forest within the Elk Creek and Days Creek South Umpqua River watershed that would benefit native species including Mardon skipper (FERC 2015). For a full discussion of mitigation activities that promote Mardon skipper habitat see Appendix O of the BA.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species**" for the Mardon skipper butterfly since the proposed Project would affect approximately 4 acres of potentially suitable habitat for this species, but create approximately 20 acres of Mardon skipper habitat by planting grass species preferred by the Mardon skipper on 20 acres of the ROW, and controlling for noxious weeds throughout the ROW.

6.2.6.3 *Coronis fritillary (Speyeria coronis coronis)*

Species Status in the Project Area

This butterfly subspecies is found in low densities in the Siskiyou Mountains, Oregon. The majority of known records are from Josephine County, and there are a few records from Jackson County, including the lower Rogue River valley and the Illinois River valley (Scheuering 2006a; Jordan 2011). As shown in Table 1, the subspecies has been documented in the Rogue River National Forest, and was recently documented on the Umpqua National Forest (Reilly and Black 2011); it has not been documented and is not suspected to occur in the Winema National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the Coronis fritillary within 5 miles of the Project on Forest Service lands (Forest Service 2006, ORBIC 2012).

This subspecies inhabits mountain slopes, foothills, dry gulches, lower elevation canyons, prairie valleys, meadows, chaparral, sage steppe, and forest glades, margins, and openings (Evergreen Aurelians 1996, Opler et al. 2011). Most known records are from lower slopes at elevations less than 2,000 feet, although elevations of 4,400 feet and 5,100 feet have also been recorded (Scheuering 2006a). In Oregon, *Speyeria coronis* adults often congregate on hillsides and meadows overgrown with rabbitbrush (*Chrysothamnus* spp.) and sagebrush (*Artemisia* spp.; Dornfeld 1980). The common food plant is species in the *Viola* genus.

Recent surveys of *S. coronis coronis* in Josephine County found this species to be generally associated with serpentine influenced, rocky hill-slopes dominated by Jeffery pine (*Pinus jeffreyi*) and other serpentine associated forbes and grasses (Reilly and Black 2011). The serpentine region of the Siskiyou Mountains consists of a roughly 450 square mile area that extend from the California border beyond Medford and includes portions of the Rogue River National Forest (Brooks 1987). Jackson County (i.e., Umpqua and Rogue River national forests) contain little serpentine soils so habitat conditions are likely different to what is found in the Illinois Valley, approximately 60 miles southwest.

On NFS lands, conifer encroachment and wildfire are potential threats at historical, current, and suspected sites. Controlled burning could also be an issue if conducted on a large scale in areas where this subspecies is known or suspected to occur. Additionally, habitat for this butterfly is threatened by off-road vehicle use at some sites (Jordan 2011).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable coronis fritillary habitat within 3,200 feet of the proposed action on the Rogue River and Umpqua national forests. Based on the habitat description above, we inferred that coronis fritillary is closely and generally associated with the Johnson and O'Neil habitat types shown below, especially on rocky hillslopes and where its primary host plant (*Viola hallii*) occurs. Table 41 lists the acreages of those habitats impacted by the Project, as well as the total acreage available within the analysis area for the coronis fritillary.

Table 41. Coronis Fritillary Habitat Associations

Habitat Type	Association	Activities	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Southwest Oregon Mixed Conifer-Hardwood Forest	General		263.13	88.78	11,718	3.00%
Shrub-Steppe	Close	Feeds and breeds	6.75	0.62	9	79.64%
Westside Grasslands	Close	Feeds and breeds	2.53	0.32	11 [3/]	26.74% [3/]

Table 41. Coronis Fritillary Habitat Associations						
Habitat Type	**Association**	**Activities**	**Total Acres Removed[1/]**	**Total Acres Modified[1/]**	**Total Acres in Analysis Area[2/]**	**Percentage Impacted**
Eastside Grasslands	Close	Feeds and breeds	0.38	0.00	1 [3/]	63.03% [3/]
Total			**272.79**	**89.73**	**11,739**	**3.09%**

1/ Totals taken from Table 6 for the Rogue River and Umpqua national forests in which the species has been documented to occur.
2/ Totals taken from Table 3 for the Rogue River and Umpqua national forests in which the species has been documented to occur.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Based on these habitat association assumptions, approximately 3 percent of available potentially suitable habitat within the analysis area would be affected by the Project, although over 50 percent of feeding and breeding habitat would be affected. However, not all the acreage listed here is likely suitable habitat as the specific habitat components associated with this species may not be present, including rocky slopes and the presence of host violet species (*Viola* sp.). Additionally, little to no serpentine soils are likely present within the analysis area so the species is not expected to occur in the densities found at locations to the southwest in Josephine County where serpentine soils and associated vegetation are prevalent.

Direct mortality could occur to this species if they are located within the ROW during Project clearing or construction of suitable habitat such as chaparral, sage, or meadows are destroyed or altered. Indirect effects could result from the alteration of composition and structure of vegetation resulting in changes in microclimate. Soil compaction may occur from construction machinery while new artificial clearings may promote invasive weeds and alter hydrology. However, non-forested habitats within the ROW would be revegetated following construction to approximate the original pre-disturbed condition, and would be replanted with appropriate seed mixes to prevent noxious weed germination. Additionally, after construction, the ROW would be monitored and any noxious weed infestations would be controlled as described in Pacific Connector's Integrated Pest Management Plan (Attachment 14 to the POD).

Herbicides used to treat invasive weeds may remove nectar plants which may affect individuals, although herbicides would only be used where they are most appropriate treatment method, and would be applied using spot treatments to minimize impact to native or non-target species. Additionally, Jordan (2011) lists conifer encroachment, wildfire, controlled burning, and off-road vehicle use as threats to this species on NFS lands; the Project would not contribute to these threats, and may reduce conifer encroachment by clearing woody vegetation from the ROW.

Cumulative Effects

The coronis fritillary cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River and Umpqua national forests (Table 13). Serpentine soil habitats preferred by the Coronis fritillary have been previously impacted by mining, recreation, and timber harvest. Mining development concentrated around serpentine deposits, fragmenting habitats with roads. Although mining claims on national forests are no longer at historical levels,

habitat impacts from development remain. Through motorized vehicle use plans, national forests limit the type and extent of off-road vehicle use (Forest Service 2009). Even though serpentine areas are generally low in forest productivity these lands have been cut for timber resulting in accelerated soil erosion and vegetation changes. Natural recolonization of disturbed serpentine soils is generally slow often taking decades for vegetation to become established. Managing these actions would likely lead to improved quantity and quality of suitable Coronis fritillary habitat on Forest Service lands.

Construction of the pipeline and associated facilities would affect 1,950 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). As described above, Project impacts would include habitat modification as well as potential mortality of individuals during construction. However, removal of woody vegetation by the Project and maintenance of the ROW in an early seral stage could create habitat for this species, and post-construction restoration would prevent noxious weeds from establishing. Within the Rogue River and Umpqua national forests, 83 acres (17 percent) of the ROW is currently forested, but would be maintained in an early seral stage within the 30-foot permanent corridor.

Proposed mitigation actions in the cumulative effects analysis area that would affect the coronis fritillary include fuels reduction and meadow habitat planting projects. Mitigation actions on federal lands would affect 7,337 acres within the cumulative effects analysis area, or 1.5 percent of the total watershed area (Table 13). Fuels reduction projects could negatively affect the mardon skipper by contributing to fire prevention, which could result in conifer encroachment which is listed as a threat to this species. However, wildfire is also listed as a threat to this species so reducing fire risk could benefit this species. Additionally, meadow habitat planting designed to benefit other meadow species (Mardon skipper, short-horned grasshopper) within the ROW on 20 acres in the Rogue River National Forest could also benefit the coronis fritillary.

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). Forest Service projects include a weed treatment project, several timber treatments, grazing allotments, and a fuelbreak project. Other projects include clearcutting on private lands, and a BLM timber sale and forest management projects (Table 12). The noxious weed treatments would benefit the coronis fritillary by reducing the threat of noxious weed invasion, and meadow restoration planned on BLM lands as part of a forest management project could also improve habitat for coronis fritillary. However, the timber sales, grazing allotments, and clearcuts could contribute to habitat alteration and disturbance within the vicinity of the proposed Project.

The proposed Project, including mitigation actions, would affect approximately 9,287 acres. Combined with 12,956 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,243 acres, or 4.5 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions could result in meadow habitat loss through fire prevention and the associated conifer encroachment, which is listed as a threat to this species. However, as wildfire is also listed as a threat to this species, the fire suppression projects would also benefit the

coronis fritillary. Additionally, clearing of the ROW and restoration following construction would create habitat for the coronis fritillary. Therefore, cumulative impacts on the coronis fritillary are expected to be insignificant, because the combined impacts to the 4.5 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts include revegetation and reseeding efforts, and road decommissioning and riparian planting that reduce soil compaction. To further avoid soil compaction, construction would occur during dry periods (May-October) and potentially use helicopters in rugged terrain (see Appendix N of the BA).

The CMP discusses mitigation measures that would generally benefit butterflies including native grasses restoration within 20 acres of the Rogue River National Forest and treatment of 120 acres of noxious weed and encroaching conifer trees in the Umpqua National Forest. Results for improvement would be immediate in stabilizing habitat surrounding the pipeline corridor. Additionally, Pacific Connector has an Agreement in Principle with the Forest Service which includes 125.3 acres of meadow restoration on the Umpqua National Forest within the Elk Creek and Days Creek South Umpqua River watershed that would benefit butterfly species (FERC 2015). For a full discussion of mitigation activities that promote butterfly habitat see Appendix O of the BA.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Coronis fritillary butterfly because the proposed Project would affect a small amount of the suitable serpentine habitat for this species, if any, and the highest population densities are located approximately 60 miles southwest of the Project.

6.2.7 Aquatic Invertebrates

Surveys were not conducted specifically for all special status aquatic invertebrates. Three of the 10 sensitive aquatic invertebrate species that were documented or suspected to occur in the national forests received Project-specific surveys (Table 1). These species were not found during surveys so they are not discussed here. The information on sensitive species occurrence is based on several GIS data sources including ORBIC occurrence records (ORBIC 2012), Johnson and O'Neil (2001) habitat associations, and the Forest Service NRIS database (Forest Service 2006).

6.2.7.1 *Western Ridged Mussel (Gonidea angulata)*

Species Status in the Project Area

Western ridged mussels are broadly distributed in Washington, Oregon, California, Idaho, Nevada, possibly Montana (Gangloff and Gustafson 2000), and southern British Columbia. In

Oregon this species historically occurred in rivers of the Coastal Range, and the main stem and tributaries of the Columbia River, including tributaries to the Snake and Malheur Rivers and John Day River mainstem (Brim Box et al. 2006). As shown in Table 1, the species has been documented in the Winema, and is suspected to occur in the Rogue River and Umpqua national forests. Neither the Forest Service nor ORBIC location database records contained observations of the Western ridged mussel within 5 miles of the Project on Forest Service lands (Forest Service 2006, ORBIC 2012).

This species inhabits creeks and rivers of all sizes and can be found on substrates varying from firm mud to coarse particles; it is rarely found in lakes or reservoirs (Taylor 1981, Frest and Johannes 1995). Freshwater mussels are filter feeders that consume phytoplankton and zooplankton suspended in the water. Western ridged mussel is a relatively slow growing and long lived species that may live 20 to 30 years (Vannote and Minshall 1982, COSEWIC 2003). Fertilized juvenile mussels attach to host fish for a period of weeks to months. Gravid females have been found from late March through mid-July, and juvenile mussels have been observed on fish from late March to early August (COSEWIC 2003, Spring Rivers 2007).

Threats include loss of host fish, introduction of non-native fish, dams, channel modification from channelization and suction dredge mining, thermal pollution, chemical pollution, sedimentation and siltation from silvicultural and agricultural practices, water withdrawal and diversion, and livestock grazing in riparian areas (Bogan 1993, Williams et al. 1993, Hovingh 2004, Lydeard et al. 2004, Krueger et al. 2007). Because this species prefers stable habitats, it may be particularly threatened by dewatering and other activities that cause shifting substrates, water level fluctuations, and seasonal hypoxia or anoxia (COSEWIC 2003). They are also particularly vulnerable during activities such as channel modification from channelization and suction dredge mining.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes river and stream habitat within 700 feet of the proposed action within all three forests (48 acres, Table 2). The Project would impact 0.6 acres (Table 6), representing 1.3 percent of available habitat. Waterbodies to be crossed by the Project are shown in Appendix C; we assume that western ridged mussel could be present in all of these waterbodies. Waterbodies crossed include 8 on the Umpqua National Forest, 2 on the Rogue River National Forest, and 4 on the Winema National Forest (Appendix C).

The dry open cut method used to cross waterbodies would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to individuals with this process, especially because they are sensitive to dewatering. Turbidity increases are generally low using this crossing method but could increase temporarily. Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing

sedimentation and solar exposure. Discharge of contaminants into streams from construction equipment is not expected.

Cumulative Effects

The Western ridged mussel cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Rogue River, and Winema national forests (Table 13). Habitat types preferred by the western ridged mussel have been negatively impacted over the past 200 years. The concentration of human development around suitable habitat has increased disturbance and eliminated habitat. Riparian areas have been damaged and removed by timber clearing practices and conversion to other uses. Riparian areas have also been trampled and polluted by grazing livestock. However, the NWFP has special land use allocations around Riparian Reserves, streams, lakes, ponds, and wetlands that protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable western ridged mussel habitat, and the fish that they depend upon, on NFS lands within the analysis area.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Project impacts on the western ridged mussel include mortality during construction, as well as negative effects associated with increased sedimentation during construction, and following construction as a result of riparian vegetation removal. However, proposed mitigation would reduce sedimentation in the long-term within the cumulative effects analysis area. Mitigation actions proposed for federal lands that could affect resources used by the Western ridged mussel include fish passage, fuels reduction, road storm proofing, road decommissioning, in stream LWD placement, riparian planting, and stream crossing repair projects.

Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13). Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas. Fuels reduction and in-stream LWD placement projects would benefit the Western ridged mussel. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). Forest Service projects that could additionally impact

the western ridged mussel include a grazing allotment that could cause short-term channel modification and increased sedimentation, and several timber treatments that could potentially increase sedimentation and disturb riparian vegetation. However, multiple aquatic restoration projects within the Umpqua River sub-basin would benefit water quality and fish habitat within the watershed. Restoration projects include culvert replacements, Riparian Reserve timber thinning and road decommissioning.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions would contribute to sedimentation, which is listed as a threat to this species. However, Project mitigation as well as other planned projects would reduce sedimentation overall within the cumulative effects analysis area long-term through riparian planting and various culvert repair and road decommissioning projects. Therefore, cumulative impacts on the Western ridged mussel are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Several projects within the Rogue River, Winema, and Umpqua national forests would benefit the mussel and include the repair of over 30 stream crossings, riparian plantings and in-stream placement of woody debris that would provide cover and improve stream integrity. For a full description of CMP activities that would benefit the western ridged mussel see Appendix O of the BA.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Western ridged mussel because the proposed Project would affect a small amount of the suitable habitat for this species (approximately 1.3 percent within analysis area) and waterbody and wetland crossing methods would be applied during construction.

6.2.7.2 *A caddisfly (Namamyia plutonis)*

Species Status in the Project Area

This species of caddisfly occurs in the Coastal and Cascade Mountain Ranges of Oregon and California (Xerces Society 2009). *Namamyia plutonis* is known from Benton, Curry, Jackson, Josephine, Lane and Marion counties. As shown in Table 1, the species has been documented in the Rogue River National Forest and is suspected to occur in the Winema and Umpqua national forests. Neither the Forest Service nor ORBIC location database records contained observations of the caddisfly within 5 miles of the Project on Forest Service lands (Forest Service 2006, ORBIC 2012).

This species is associated with open-water lakes, rivers, and stream habitats. Populations tend to be extremely localized and are patchily distributed. Currently, fewer than 30 locations are known to contain this caddisfly, which occurs in low numbers. This caddisfly tends to be found associated with small streams in densely forested old growth or mature forest watersheds (Scheuering 2006b). Larvae have been found among core samples collected from areas composed of coarse gravel mixed with silt and organic sediments (Anderson 1976). In a single year the species develops from egg through five larval instars, pupate and then emerge as adults (Wiggins 1996). Regardless of habitat, caddisfly adults tend to remain somewhat near the emergence site where oviposition occurs (Collier and Smith 1998).

Threats to the caddisfly include chemical pollution, sedimentation, and eutrophication from construction and timber harvesting.

Analysis of Effects

Direct and Indirect Effects

The analysis area includes river and stream habitat within 700 feet of the proposed action within all three forests (48 acres, Table 2). The Project would impact 0.6 acres (Table 6), representing 1.3 percent of available habitat. Waterbodies to be crossed by the Project are shown in Appendix C; we assume that *Namamyia plutonis* could be present in all of these waterbodies. Waterbodies crossed include 8 on the Umpqua National Forest, 2 on the Rogue River National Forest, and 4 on the Winema National Forest (Appendix C).

The dry open cut method used to cross waterbodies would either be flume or dam and pump, both of which maintain downstream flows and isolate the construction area from the streamflow. Construction across small or intermediate waterbodies generally takes seven days using these methods. Some mortality could occur to individuals with this process. Turbidity increases are generally low using this crossing method but could increase temporarily. Indirect effects could occur through the harvest of riparian vegetation on either side of the stream for the width of the ROW, potentially increasing sedimentation and solar exposure. Discharge of contaminants into streams from construction equipment is not expected.

Cumulative Effects

The *Namia plutonis* cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Umpqua, Rogue River, and Winema national forests (Table 13). Habitat types preferred by the caddisfly have been negatively impacted over the past 200 years. Development has concentrated around bodies of water, increasing disturbance, and eliminating habitat. Riparian areas have been damaged and removed by timber clearing practices and conversion to other uses. Protection and management of riparian habitat including maintenance of shading, water quality, and sediment control would likely benefit this species (Xerces Society 2009). The NWFP designates Riparian Reserves around streams, lakes, ponds, and wetlands to protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable caddisfly habitat on Forest Service lands within the analysis area.

Construction of the pipeline and associated facilities would affect 2,181 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Project impacts on *Namia plutonis* include mortality during construction, as well as negative effects associated with increased sedimentation during construction, and following construction as a result of riparian vegetation removal. However, proposed mitigation would reduce sedimentation in the long-term within the cumulative effects analysis area. Mitigation actions proposed for federal lands that could affect resources used by *Namia plutonis* include fish passage, fuels reduction, road storm proofing, road decommissioning, in stream LWD placement, riparian planting, and stream crossing repair projects. Mitigation actions on federal lands would affect 7,734 acres within the cumulative effects analysis area, or 1.4 percent of the total watershed area (Table 13).

Sediment could be mobilized into waterbodies during fish passage, road decommissioning, and stream crossing repair projects, especially where culverts are removed or replaced; however, long term beneficial effects include reconnection of aquatic habitats, sediment reduction, and shade restoration. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal where the Project affects streams and riparian areas. Fuels reduction and in-stream LWD placement projects would benefit *Namia plutonis* if present. Placement of LWD in streams adds structural complexity to aquatic systems, traps fine sediments and can contribute to reductions in stream temperatures over time. Fuels reduction projects would lower the risk of loss of mature stands and other valuable habitats to high-intensity fire, which can contribute substantial sediment to streams and result in flooding and erosion during post-fire precipitation events. Therefore, fuels reduction Project would benefit *Namia plutonis* by protecting both the aquatic habitat used by the species, as well as the surrounding mature forests with which it is associated. These proposed mitigation projects are described in detail in Appendix F of the FEIS for the Project (FERC 2015).

Planned projects within the cumulative effects analysis area include a variety of timber, fuel, grazing and biological projects (Table 12). Forest Service projects that could additionally impact *Namamyia plutonis* include a grazing allotment that could cause short-term channel modification and increased sedimentation, and several timber treatments that could potentially increase

sedimentation and disturb riparian vegetation. Multiple aquatic restoration projects within the Umpqua River sub-basin would benefit water quality and fish habitat within the watershed. Restoration projects include culvert replacements, Riparian Reserve timber thinning and road decommissioning.

The proposed Project, including mitigation actions, would affect approximately 9,915 acres. Combined with 13,026 acres of overlapping reasonably foreseeable activities described above, acreage impacted within the cumulative effects analysis area includes 22,941 acres, or 4.2 percent of the total watershed area (Table 13). The proposed action combined with reasonably foreseeable actions would contribute to sedimentation, as well as potential eutrophication from construction and timber harvest, all of which are listed as a threat to this species. However, Project mitigation as well as other planned projects would reduce sedimentation overall within the cumulative effects analysis area long-term through riparian planting and various culvert repair and road decommissioning projects. Therefore, cumulative impacts on *Namamyia plutonis* are expected to be insignificant, because the combined impacts to the 4.2 percent of the cumulative effects analysis area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific mitigation measures that would minimize impacts include the containment and safe disposal of hazardous materials and pollutants as discussed in the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings. As part of the CMP, Riparian Reserves would be restored or maintained through the NWFP Aquatic Conservation Strategy, and a 100-foot buffer beyond the ordinary high water mark would be maintained. These activities and a full description of aquatic mitigation measures are found in Appendix L, N, and O of the BA.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the *Namamyia plutonis* caddisfly because the proposed action would affect a small amount of the suitable habitat (approximately 1.3 percent within the analysis area) for this species and waterbody and wetland crossing methods would be applied during construction.

6.2.7.3 *Archimedes springsnail (Pyrgulopsis archimedis)*

Species Status in the Project Area

The possible range of the Archimedes springsnail includes Lower Klamath Lake and Tule Lake, California where sites have been documented in the past but have not been relocated and may be extinct (Frest and Johannes 1996). It is known from a handful of spring-influenced sites in the vicinity of Upper Klamath Lake in Klamath County, Oregon. The range description for the

Archimedes springsnail is based on very few documented locations. As shown in Table 1, the species has been documented to occur on the Winema National Forest; it has not been documented and is not suspected to occur in the Rogue River or the Umpqua National Forest. Neither the Forest Service nor ORBIC location database records contained observations of the Archimedes springsnail within 5 miles of the Project on NFS lands.

The species is found in large spring outflows and spring-influenced sites near shore in Upper Klamath Lake. It is associated with open water-lakes, rivers, and stream habitats (Frest and Johannes 1996). The species prefers sites with gravel-boulder basalt and pumice substrates and few macrophytes. It grazes on the sides and lower surfaces of larger stones (Frest and Johannes 1996). The Archimedes springsnail is a totally aquatic gastropod with a single-year lifespan. The biology of this species is not well understood and needs further investigation.

Threats to the species includes the alteration or degradation of perennial water quality. A variety of activities can impact water quality and include road construction and maintenance, livestock grazing, recreation, and dewatering springs for irrigation or construction (Frest and Johannes 1996).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes river and stream habitat within 700 feet of the proposed action within the Winema National Forest (39 acres, Table 2). The Project would impact 0.03 acres of that habitat (Table 6), representing 0.07 percent of available habitat. Waterbodies to be crossed by the Project include Spencer Creek and three tributaries to Spencer Creek on the Winema National Forest (Appendix C). These waterbody crossings are far from known sites – with the closest known site occurring greater than 10 miles from the Project.

If the species were to occur in impacted area, habitat modification could occur. Because this snail is an annual species, the entire population may be extirpated if all individuals at an isolated spring site are lost in one incident. Any action which reduces the ground water discharge at springs or seeps may result in adverse changes to water chemistry and habitat quality in downstream habitats especially during Project related activities such as trenching and waterbody crossing. Lowering the water table or diverting the outflow of springs such that sites are dewatered, even temporarily, can eliminate an entire population (Frest and Johannes 1996).

Cumulative Effects

The Archimedes springsnail cumulative effects analysis area consists of the Spencer Creek fifth field watershed. Construction of the pipeline and associated facilities would affect 231 acres within the cumulative effects analysis area, or 0.4 percent of the total watershed area (Table 13). Potential Project impacts include habitat modification at stream crossings and potential mortality of individuals, if present. However, this species is not known to occur within 10 miles of the Project, and Upper Klamath Lake, where this species is documented, is outside the Spencer Creek fifth field watershed.

This species is threatened by habitat destruction and water quality degradation. The major determining factor for the persistence of the Archimedes springsnail at spring sites is perennial water quality. Any action which reduces the ground water discharge at springs or seeps may result in adverse changes to water chemistry and habitat quality in downstream habitats. Lake and river sites may be adversely affected by fluctuating water levels caused by drought or by draw-downs for irrigation or power generation. Several spring flows around Upper Klamath Lake have been altered during road construction, altering habitat conditions at snail sites. Sites may also be degraded by grazing cattle, as a result of trampling, pollution from feces and urine and removal of vegetation (Frest and Johannes 1996). However, the NWFP designates Riparian Reserves around streams, lakes, ponds, and wetlands to protect these resources. Standards and guidelines within the NWFP limit livestock grazing around aquatic areas and provide measures to minimize impacts from timber harvest. These actions would likely lead to improved quantity and quality of suitable habitat on Forest Service lands within the analysis area.

Several mitigation projects have been identified in the Spencer Creek watershed that would benefit the Archimedes springnail, if present, by reducing sedimentation and improving riparian vegetation conditions in the long term. Riparian planting is proposed for Spencer Creek, downstream of the Project crossing. Shade provided by the plantings would contribute to moderating water temperatures in Spencer Creek, and root strength provided by new vegetation would increase bank stability and decrease erosion and sediment depositions to Spencer Creek. Fencing between the Project ROW and an adjacent grazing allotment has been proposed in order to keep cattle from grazing newly re-vegetated areas in the Project corridor, including areas where the corridor crosses Spencer Creek, thus helping to ensure that erosion control and re-vegetation objectives are met. Approximately 1.0 mile of LWD placement is proposed for Spencer Creek to mitigate Project effects by adding structural complexity to the aquatic system, trapping fine sediments, and potentially reducing the stream temperature over time. Road decommissioning and ford hardening within the cumulative effects analysis area would also improve habitat for the Archimedes springsnail, if present. Mitigation actions on federal lands would affect 397 acres within the cumulative effects analysis area, or 0.7 percent of the total watershed area (Table 13).

Planned projects on the Winema National Forest include a grazing allotment, road maintenance, noxious weed treatments, and a timber harvest project (Table 12). Livestock grazing could contribute to habitat modification and increased sedimentation, and harvest treatments could potentially disturb riparian vegetation. Both these actions could reduce water quality and thus negatively affect the Archimedes springsnail. Bank stabilization and reduction of sediment flow would likely have long-term benefits for the species.

The proposed Project, including mitigation actions, would affect approximately 628 acres. Combined with 70 acres overlapping reasonably foreseeable activities, approximately 698 acres within the cumulative effects analysis area would be affected, or 1.3 percent of the total watershed area (Table 13). The proposed action as well as planned projects could temporarily increase sediment and remove riparian vegetation, thus degrading water quality within the cumulative effects analysis area. However, Project impacts on water quality would be

temporary, and minimized or mitigated with the measures discussed below. Therefore, cumulative impacts on the Archimedes springsnail are expected to be insignificant because the combined impacts to the 1.3 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

Specific conservation measures that would help minimize Project-related impacts are described in the Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures (Appendix C of the BA), the Erosion Control and Revegetation Plan (Appendix F of the BA), and the Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA). Impacts to streams and waters would be reduced with use of erosion control and bank stability techniques. LWD would be left or reestablished along stream crossings which would contribute to the stability of the streambank and reduce erosion (Appendix N of the BA).

As part of the CMP, Riparian Reserves would be restored or maintained through guidance provided in the NWFP Aquatic Conservation Strategy. Within the Winema National Forest, there are several projects planned within the Spencer Creek watershed that includes a stream crossing repair and approximately 1 mile of riparian plantings and in-stream placement of woody debris that would provide cover and improve stream integrity. In addition, over 5 miles of road would be decommissioned in Riparian Reserves to improve water quality and reduce fragmentation. For a full description of CMP activities that would benefit the Archimedes springsnail see Appendix O of the BA.

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for the Archimedes springsnail because the species is unlikely to be encountered, the proposed Project would affect a small amount of the suitable habitat (0.07 acres within analysis area) for this species and waterbody and wetland crossing methods would be applied during construction.

6.2.8 Plants and Fungi

Surveys were conducted for all vascular, non-vascular and fungi species on Forest Service lands. Botany surveys were conducted between April 13 and August 20, 2007, and April 28 and August 6, 2008. Reroutes of alternatives and minor route adjustments garnered additional surveys and were conducted June through September, 2010, and April through June, 2014 (Table 42).

Table 42. Survey Schedule for Vascular and Non-Vascular Plant Surveys on National Forest Lands

Project Eco-Regions	MP	Vascular Surveys[1/]	Non-Vascular Surveys
South Umpqua Moist Forest (Includes the Umpqua National Forest)	89-113	June 7-August 2, 2007	
		June 20 and August 6, 2008	
		August 24, 2010	
		May 29 and June 19, 2014	
Rogue Foothills Dry Conifer Forest and Valley Edges (Includes portions of the Rogue River National Forest)	113-150	April 13-30, 2007	
		June 14-29, 2007	
		April 28-May 23, 2008	
		May 24, 2014	
Cascade Moist Forest (Includes portions of the Rogue River and Winema national forests)	150-179	July 7-July 28, 2007	
		July 14 and August 3, 2008	
		August 16, 2010	

1/ 2010 and 2014 surveys focused on alternative re-routes and persistence surveys for special status species observed during previous surveys.

Botanists worked in pairs or singly and walked the survey area on foot. Full coverage complete surveys were conducted along the centerline and in the construction ROW. Along the corridor margins, surveys were conducted in an intuitive-controlled meander, where botanists stratified their survey effort, focusing on habitat(s) with potential for special status species. Botanists recorded all common species encountered in field notebooks. Species that could not be easily identified in the field were collected and identified later in the lab. Botanists maintained field notes of habitat encountered, and recorded MPs (or acres) considered to be suitable habitat for federal or state listed species. When a special status vascular or non-vascular plant species was encountered, botanists recorded the Global Positioning System location, determined the area and population (i.e., number of plants) of the plant site location, recorded habitat data and associated species, and mapped the site on 1:200 scale maps. Plant sites located on Forest Service lands were flagged for future location and identification. Plant site locations were later digitized into GIS shape files and site maps were created (SBS 2008, SBS 2011b).

Surveys were conducted for over 200 vascular and non-vascular species. Of these species, one Forest Service sensitive species addressed in this BE, Bellinger's meadowfoam, was documented in the Rogue River National Forest. An additional Forest Service sensitive species, bensonia (*Bensoniella oregano*), was documented on BLM lands but is not discussed here as no impacts are expected on Forest Service lands (see Appendix A).

6.2.8.1 *Bellinger's meadowfoam (Limnanthes floccosa bellingeriana)*

Species Status in the Project Area

Bellinger's meadowfoam has a range restricted to several counties within northern California and southern Oregon. The species is considered a narrow endemic but locally abundant with relatively more occurrences on BLM and private lands than on Forest Service lands (Rolle

2014). In Oregon, this subspecies is known from over 100 sites in Jackson County and an unknown number in Klamath County (NatureServe 2013, ORBIC 2013, Rolle 2014). As shown in Table 1, the species has been previously documented on the Rogue River National Forest; it has not been documented and is not suspected to occur in the Winema or the Umpqua national forests. Bellinger's meadowfoam has been observed within the impact area and within 1 mile of the Project in the Rogue River National Forest. Field surveys in 2008 located approximately 2,300 plants within 0.5 acres in clay soils in a seasonally saturated rocky meadow at MP 154.1 (SBS 2008). In 2010, surveys documented approximately 30,000 plants within 0.8 acres between MPs 154.8 and 154.7, in the vicinity of Heppsie Mountain (SBS 2011b).

The species is associated with cismontane woodlands and moist meadows with seeps and wetlands. Woodlands typically have an open canopy where oaks and conifer trees dominate and understories may be open and herbaceous or closed and shrubby (CalFlora 2014). It is associated with vernally wet meadows or vernal pools, and is generally found on nutrient-poor basalt scablands. The species typically occurs at elevations between 1,000 and 4,000 feet and blooms from April to June (Meinke 1982). This species is able to grow on disturbed sites and withstand grazing, although it is unable to complete with weedy species (Rolle 2014).

Bellinger's meadowfoam has a global status of vulnerable and current population trends appear stable but not increasing (NatureServe 2013). A major threat to Bellinger's meadowfoam is habitat degradation as non-native invasive plant species continue to move onto vernally moist scablands. In addition, grazing of vernally moist areas and hydrologic manipulations of all kinds that alter or dry out vernally moist areas may contribute to the decline of this species (Rolle 2014).

Analysis of Effects

Direct and Indirect Effects

The analysis area includes all suitable Bellinger's meadowfoam habitat within 700 feet of the proposed action in the Rogue River National Forest. Table 43 shows the habitat types in the analysis area with which the species is generally or closely associated, and the acreages of those habitats impacted by the Project.

Table 43. Bellinger's Meadowfoam Habitat Associations

Habitat Type	Association	Total Acres Removed[1/]	Total Acres Modified[1/]	Total Acres in Analysis Area[2/]	Percentage Impacted
Westside Grasslands	Generally Associated	2.53	0.32	10.67 [3/]	26.74% [3/]
Eastside Grasslands	Generally Associated	0.38	0.00	0.61 [3/]	63.03% [3/]
Herbaceous Wetlands	Closely Associated	0.00	0.00	0.06	0.00%
Westside Riparian Wetlands	Generally Associated	0.00	0.00	8.34	0.00%
Eastside Riparian Wetlands	Generally Associated	0.00	0.00	0.00	0.00%
Total		**2.91**	**0.32**	**19.68**	**16.45%**

1/ Totals taken from Table 6 for the Rogue River National Forest in which the species has been documented to occur.
2/ Totals taken from Table 2 for the Rogue River National Forest in which the species has been documented to occur; does not include habitat located in the Umpqua or Winema national forests or on other federal or non-federal lands.
3/ Delineation of grassland habitat outside of Project impacts was limited so the total acres within the analysis area is likely an underestimate, and the percentage impacted is likely an overestimate.

Direct impacts to the site observed in 2008 at MPs 154.1 would not be expected as the TEWA proposed for that location was eliminated from consideration, and the site is now approximately 95 to 255 feet south of a TEWA at its closest distance to the Project.

Potential impacts to the site observed in 2010 between MPs 154.8 and 154.7 include removal of individuals and permanent loss or alteration of habitat including changes in hydrology. The site is located in a vernally moist scabland meadow within the proposed Project ROW and a TEWA and therefore would be disturbed by the Project (SBS 2011b; Rolle 2014). Approximately 10 percent of the population was in the proposed ROW and an immediately-adjacent TEWA. Another 80 percent was in a large TEWA that included nearly all of the meadow to the south of the ROW. Approximately 10 percent was outside of the construction area. Direct effects of the proposed action would consist of temporary disturbance and permanent loss or alteration of habitat by directly removing or damaging plants, compacting soils, or disturbing the soil layers. The Project could also potentially impact the hydrology of this site because construction activities would disturb soil composition and potentially influence erosion and water retention properties. A source seep is located at the head of the meadow, approximately 200 feet from the centerline.

Indirect effects could include removal of currently unoccupied but suitable habitat such as wet meadows, wet prairies, and wetland and riparian areas. Construction activities could create opportunities for invasive species that could outcompete and/or exclude Bellinger's meadowfoam from areas previously inhabited.

Although Project activities would affect the local population at MP 154.7, the species would not likely be eliminated from the site as it is able to grow on disturbed soil (Rolle 2014). Additionally, although the site that would be affected is one of only a few Bellinger's meadowfoam sites on

Forest Service land, a large number of sites are known from BLM and private land in eastern Jackson County, Many more undocumented sites are likely to occur on unsurveyed private lands (Rolle 2014). Consequently, the expected loss of individuals and habitat at this site is not expected to affect the viability of Bellinger's meadowfoam over the broader geographic area of the low mountains and foothills of eastern Jackson County (Rolle 2014).

Cumulative Effects

The Bellinger's meadowfoam cumulative effects analysis area includes the fifth field watersheds crossed by the Project on the Rogue River National Forest: Big Butte Creek and Little Butte Creek. Construction of the pipeline and associated facilities would affect 731 acres within the cumulative effects analysis area, or 0.3 percent of the total watershed area (Table 13). Project impacts include removal of individuals, and habitat modification, although these effects would be minimized and mitigated as described below under Conservation Measures and Mitigation.

Noxious weeds and non-native invaders began to appear and spread with European settlement and continue to arrive today. The introduction of non-native invasive plants has increased dramatically in the past decade. Local spread of noxious weeds can be natural; but human activities such as, recreation, vehicle travel, and the movement of contaminated equipment, products, and livestock often greatly increase the distance and rate of dispersal. This spread of noxious weeds degrades native habitats, and has decreased suitable Bellinger's meadowfoam habitat.

Wetlands in the cumulative effects analysis area have been lost due to draining and conversion to other land uses. Continued canopy closure of wet meadows resulting from years of fire suppression may continue to shrink existing populations of Bellinger's meadowfoam. In addition, grazing of wet meadows and development of cattle troughs and irrigation ditches that dry down wetlands may also contribute to the decline of this species. Though one-third of Oregon wetlands are estimated to have been lost since the late 1700s, wetlands are now protected under federal law (Dahl 1990). The NWFP protects wetlands (Forest Service and BLM 1994). Riparian areas have also decreased dramatically, their acreage and connectivity lost to development, timber clearing, and grazing. The NWFP protects riparian areas by designating protected areas with specific management objectives around streams, ponds, and lakes. Further, the NWFP has special land use allocations around riparian areas, streams, lakes, ponds, and wetlands that protect these resources. Wetlands are often associated with meadows, another habitat component for Bellinger's meadowfoam. Meadows are further protected under the NWFP through measures that conserve great gray owl habitat by prohibiting tree-clearing within 300 feet of a meadow's edge. These management activities may result in improved quantity and quality of Bellinger's meadowfoam habitat in the analysis area in the future.

On the Rogue River National Forest, planned projects include eight grazing allotments that could potentially impact suitable habitat for Bellinger's meadowfoam by introducing weeds or changing hydrology (Table 12). The planned projects would affect 3,712 acres, or 1.3 percent of the watersheds.

The proposed Project, including mitigation actions, would affect approximately 1,434 acres. Combined with 3,712 acres overlapping reasonably foreseeable activities, approximately 5,146 acres within the cumulative effects analysis area would be affected, or 1.8 percent of the total watershed area (Table 13). The proposed action as well as planned projects would remove individuals and degrade habitat; however, Project impacts would be mitigated through site restoration and noxious weed control as described below. Therefore, cumulative impacts on Bellinger's meadowfoam are expected to be insignificant because the combined impacts to the 1.8 percent of the watershed area are not expected to have a measureable effect on the species.

Conservation Measures and Mitigation

In order to avoid impacts to the Bellinger's meadowfoam site observed at MP 154.1 during surveys in 2008, Pacific Connector adopted a minor route adjustment and the site is now approximately 95 to 255 feet south of a TEWA at its closest distance to the Project; the Project is not expected to affect this site. Measures to avoid the site discovered in 2010 in the Rogue River National Forest, were considered but excluded in order to avoid a rare fungus, *Gymnomyces abietis*, which was also found at the same location on the north end of the meadow at MP 154.8.

The Forest Service recommends the following specific conservation measures for the Bellinger's meadowfoam site at MP 154.7:

- Collect seeds prior to pipeline construction.
- During and after pipeline construction in the meadow, clean machinery, people, and tools of soil and debris to avoid the spread or introduction of invasive plants.
- After construction, conduct ground scarring and recontouring to return the site to vernally moist conditions. This would include creating ground contours to prevent the meadow from draining excessively, and retaining some compacted areas and shallow swales.
- Re-seed the area with the collected seeds. Other native species could be included in seed mixes at this location, but not in proportions that would lessen the ability of Bellinger's meadowfoam to re-establish from the re-seeding effort.
- For 3 years following construction, use formulations of the herbicide glyphosate to spot spray invasive weeds, especially the locally abundant medusahead, while allowing native grass and meadowfoam to grow (Rolle 2014; glyphosate is recommended because imazapic tends to run from the site of application and will follow the slope to the Limnanthes population).

Additional mitigation measures that would minimize impacts include site restoration and habitat enhancement measures as discussed in the CMP (see Appendix O of the BA). Pacific Connector has an Agreement in Principle with the Forest Service that includes 125.3 acres of meadow restoration on the Umpqua National Forest within the Elk Creek and Days Creek South Umpqua River watershed that may benefit native plant species that rely on meadow habitats (FERC 2015). For a full discussion of conservation plans that promote grassland and meadow

habitats see Appendix O of the BA. In addition, the containment and safe disposal of hazardous materials and pollutants would minimize soil contamination and are discussed in Pacific Connector's Spill Prevention, Containment, and Countermeasures Plan (Appendix L of the BA).

Determination of Impact

In considering the direct, indirect, and cumulative impacts of the Project, it is determined that the proposed action **"may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species"** for Bellinger's meadowfoam because the large number of occurrences of the species outside of NFS lands, this species' tolerance of disturbance, and the proposed conservation and mitigation measures described above that would minimize impacts to the species on NFS land.

7.0 SIGNATURE

Must be signed by Journey-level botanist (> GS-11) or designated authority by Forest Supervisor. Must be completed prior to signing of Decision Memo.

_____	_____
Jeff Von Kienast, District Wildlife Biologist	Date
_____	_____
District Botanist	Date
_____	_____
District Fish Biologist	Date

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Appendix A: Sensitive Species that Are Not Expected to Be Impacted by the Project

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Table A-1.: Forest Service Sensitive Terrestrial Wildlife Species Not Expected to be Impacted by the Project			
Common Name and *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Mammals			
Pygmy rabbit *Brachylagus idahoensis*	Tall dense clumps of sagebrush, also in greasewood. Deep, friable soils for burrows.	S – FWI	No currently known sites in Klamath County
North American wolverine *Gulo gulo luscus*	Rugged, subalpine to high alpine areas with a mix of tree cover, alpine meadow boulders, avalanche chutes, and patches of spring snow.	S – FWI S – UMP S – RRS	Does not occur in Project vicinity
Birds			
Yellow rail *Coturnicops noveboracensis*	Freshwater and coastal estuary marshes. Requires areas with shallow water and vegetative cover.	D – FWI S – UMP	Does not occur in Project vicinity
Black swift *Cypseloides niger*	Associated with steep, tall waterfalls	D – UMP	No suitable habitat in survey area
Northern waterthrush *Seiurus noveboracensis*	Wooded swamps and riparian thickets in forests and scrub	D – RRS	Extremely limited breeding range in Oregon that occurs >50 miles from the Project area.
Amphibians			
Siskiyou Mountains salamander *Plethodon stormi*	Loose rock rubble or talus on north-facing slopes or in dense wooded areas.	D – RRS	Outside of known range.
Black salamander *Aneides flavipunctatus*	Near streams, in talus slopes or under rocks and logs. Inhabits open woodlands, and mixed coniferous and mixed-coniferous-deciduous forests.	D – RRS	Outside of known range

Table A-1.: Forest Service Sensitive Terrestrial Wildlife Species Not Expected to be Impacted by the Project			
Common Name and *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
California slender salamander *Batrachoseps attenuatus*	Lower-elevation forests along the southern coast, including hardwood, redwood, and other coniferous forests. Also in open areas with scattered trees. Under rocks, logs, or other objects on the ground.	D – RRS	Outside of known range
Northern leopard frog *Lithobates pipiens*	Marshes, wet meadows, vegetated irrigation canals, ponds, and reservoirs. Prefers quiet or slow flowing waters.	S – FWI	Outside of known range
Columbia spotted frog *Rana luteiventris*	Rarely far from permanent quiet water; usually at grassy/sedgy margins of streams, lakes, ponds, springs, and marshes; may disperse into forest, grassland, during wet weather.	S – FWI	Outside of known range
Terrestrial Invertebrates			
Seaside hoary elfin butterfly *Callophrys polios maritima* (formerly hoary elfin)	Maritime species found in close association with kinnikinnick (*Arctostaphylos uva-ursi*).	S – RRS	Does not occur in Project vicinity
Green sideband *Monadenia fidelis beryllica*	Generally inhabit deciduous stands (including alder) and brush in wet, relatively undisturbed forest; low elevation; low coastal scrub.	D – RRS	Not located during surveys
Modoc sideband *Monadenia fidelis ssp. Nov.*	Talus and wetted rocky areas on lakeshore; mixed pine-Douglas-fir forest or open grasslands; associated with seeps and springs in talus deposits.	D – FWI	Not located during surveys
Crater Lake tightcoil *Pristiloma arcticum crateris*	Mature conifer forests; perennially wet areas among rushes, mosses, and other surface vegetation or under rocks and woody debris within 30 feet of open water in wetlands, springs, seeps, and riparian areas.	D – FWI D – RRS D – UMP	Not located during surveys
Leona's little blue butterfly *Philotiella leona*	Mazama ash and pumice fields east of Crater Lake with sub-surface moisture and spurry buckwheat (*Eriogonum spergulinum reddingianum*) caterpillar host plant.	D – FWI	Does not occur in Project vicinity

Table A-1.: Forest Service Sensitive Terrestrial Wildlife Species Not Expected to be Impacted by the Project			
Common Name and *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Insular blue butterfly (*Plebejus saepiolus littoralis*)	Generally associated with wet habitat such as stream edges, bogs, and wet meadows, but also occurs in drier sites containing blooming clover, such as road sides,	S – RRS	Does not occur in Project vicinity; coastal species.
California shield-backed bug *Vanduzeeina borealis californica*	A tall grass prairie specialist; inhabits high elevation natural balds and meadows	S – RRS S – UMP	No suitable habitat in survey area

1/ Expected Habitat: Adamus et al. 2001, Csuti et al. 2001, NatureServe 2013; ORBIC 2006; Gilligan et al. 1994; Kozloff 1976, ISSSSP 2014, Hoffman 2005.
2/ Occurrence Key:
National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest
D = Documented within Forest Service Management Area
S = Suspected within Forest Service Management Area

Table A-2: Forest Service Sensitive Fish and Aquatic Invertebrates Not Expected to be Impacted by the Project				
Common Name and *Scientific Name*[1/]	**Expected Habitat[2/]**	**Documented or Suspected Occurrence[3/]**	**Waterbodies Crossed by Project or within Vicinity of Project Area[4/]**	**Reason for Determination**
Anadromous fish				
Chum salmon (Pacific Coast ESU) *Onocorhynchus keta*	Rears in the Pacific Ocean for most of its life and spawns in freshwater streams in the fall. Utilizes low gradient, gravel-rich, barrier-free habitats and productive estuaries. Juveniles migrate to estuarine environments after emergence.	I – UMP I – RRS	Unknown	Does not occur in vicinity of project
Chinook Salmon (Oncorhynchus tshawytscha), Southern Oregon /Northern California Coastal ESU, Fall-run and Spring-run	Anadromous species that rears in the Pacific Ocean for most of its life and spawns in freshwater streams. Most enter Oregon's coastal rivers April to December, but some start in February. Spawning generally occurs from October to early March. Preferred spawning and rearing areas have a low gradient (<3%); adults often ascend to higher gradient reaches to find spawning areas. Spawns and rears in a range of sizes of streams and rivers, and often uses estuaries for rearing. Adults require deep pools within proximity to spawning areas where they hold and mature between migration and spawning.	D-RRS	No	Natural barrier in the South Fork Little Butte Creek precludes presence upstream where waterbodies are crossed by Project.
Steelhead Oregon Coast ESU *(Oncorhynchus mykiss)*	Anadromous species; juveniles rear in freshwater streams 1-4 years. Adults live in marine environment prior to spawning mostly in winter or spring. May spawn more than once.	D-UMP D-RRS	No	Does not occur upstream of Galesville Reservoir, impacted streams well upstream of occurrence area.
Aquatic Invertebrates				
Turban pebblesnail *Fluminicola turbinformis*	Freshwater, very cold in semi-arid sage scrub. Substrate is mud, basalt gravel, bedrock and gravel, with bedrock.	D – FWI	Unknown	Not located during surveys

Table A-2: Forest Service Sensitive Fish and Aquatic Invertebrates Not Expected to be Impacted by the Project				
Common Name and *Scientific Name*[1/]	**Expected Habitat[2/]**	**Documented or Suspected Occurrence[3/]**	**Waterbodies Crossed by Project or within Vicinity of Project Area[4/]**	**Reason for Determination**
Great Basin ramshorn *Helisoma newberryi newberryi*	Larger lakes, slow rivers, larger spring sources, spring-fed creeks; burrow in soft mud.	D – FWI		Not located during surveys
Highcap lanx *Lanx alta*	Freshwater in Middle Rogue, Upper Klamath Sub-basins, possibly extirpated Larger tributaries and outcrops, on upper surfaces of bedrock and bedrock outcrops. Cold, fast-flowing, highly oxygenated, clear water. Semelparous with a lifespan of 1 to 2 years. Eggs are laid from spring to fall. Lack a larval stage. Feed through scraping.	D – FWI D – RRS	Unknown	No suitable habitat in survey area
Scale lanx *Lanx klamathensis*	Spring-influenced portions of large lakes and streams or limnocrene springs; boulder/cobble substrates; well-oxygenated, cold water.	D – FWI S – RRS	Lost, Upper Klamath	Not located during surveys
Rotund lanx *Lanx subrotunda*	The rotund lanx is found in unpolluted rivers and large streams at low to moderate elevations, in highly oxygenated, swift-flowing, cold water on stable cobble, boulder or bedrock substrates.	D – FWI D – UMP	Upper Klamath	Not located during surveys
Montane peaclam (*Pisidium ultramontanum*)	The Montane peaclam is a local riparian endemic associated with lakes and springs. It is generally found on sand-gravel substrates in spring-influenced streams and lakes, and occasionally in large spring pools.	D-FWI	Upper Klamath	Closest known location greater than 10 miles from the Project at Upper Klamath Lake.
Robust walker *Pomatiopsis binneyi*	Freshwater, possibly extirpated Coos Subbasin, seeps, rivulets, shallow mud banks and marsh seepages leading into shallow streams. Semi-aquatic.	D – RRS	Unknown	Not located during surveys

Table A-2: Forest Service Sensitive Fish and Aquatic Invertebrates Not Expected to be Impacted by the Project				
Common Name and *Scientific Name*[1/]	**Expected Habitat[2/]**	**Documented or Suspected Occurrence[3/]**	**Waterbodies Crossed by Project or within Vicinity of Project Area[4/]**	**Reason for Determination**
Pacific walker Pomatiopsis californica	The Pacific Walker is a riparian associate semi-aquatic snail characteristically found among wet leaf litter and vegetation, beside flowing or standing water in shaded situations where humidity remains high	S – RRS	Unknown	Does not occur in vicinity of project; historical range included narrow coastal fog belt of Pacific Coast.
Haddock's Rhyacophilan caddisfly *Rhyacophila haddocki*	Streams are perennial, fed by cold-water springs with discharge relatively stable year-round. Microhabitats include runs and glides with deep, well-aerated gravel and coarse sand.	D – RRS	Unknown	Does not occur in vicinity of project; currently known only from Benton and Curry county.
Lined rams-horn (*Vorticifex effusa diagonalis*)	Found in spring-fed lakes and limnocrenes, as well as large streams with spring influence. Very cold, highly oxygenated water on stable (boulder-gravel) substrate, at fair depth (not in shallows).	D-FWI	Upper Klamath	Does not occur in vicinity of project; currently known from Crater Lake and NE Upper Klamath Lake.

1/ ESU = Evolutionarily Significant Unit
2/ Life Histories and Expected Habitat References: Kostow 1995; NatureServe 2013; ODFW 2005; ISSSSP 2014; FWS 1994.
3/ Occurrence Key:
National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest
D = Documented within the Forest Service management area
S = Suspected within the Forest Service management area
I = Forest Service Actions Influence Downstream
4/ Waterbodies Crossed: ORNHIC 2006; Kostow 1995, ISSSSP 2014.

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Bryophytes			
Tiny Notchwort *Anastrophyllum minutum*	On peaty soil >5,500 feet. In the Tsuga mertensianazone, typically associated with ledges or at the base of cliffs.	S – FWI S – RRS S – UMP	Not documented in Project survey
Broad-leaved lantern moss *Andreaea schofieldiana*	Forms mats on dry and exposed to moist, shaded igneous rocks, montane to subalpine.	D – RRS S – UMP	No suitable habitat in survey area
Spidery threadwort *Blepharostoma arachnoideum*	Old growth forests, in mesic habitats, where it most often grows on rotten logs.	D – UMP	Not documented in Project survey
Giant fourpoint *Barbilophozia lycopodioides*	Forming mats on peaty soil on damp ledges of rock outcrops and cliffs at higher elevations (known sites in OR and WA: 3,400-7,500 feet).	S – FWI	Not documented in Project survey
Beautiful bryum *Bryum calobryoides*	Rock outcrops and shallow soil.	D – RRS S – UMP	Not documented in Project survey
Bog pouchwort *Calypogeia sphagnicola*	Sphagnum containing wetlands.	D – RRS D – UMP	No suitable habitat in survey area
Spiny threadwort *Cephaloziella spinigera*	Wetlands containing Sphagnum.	D – FWI D – RRS S – UMP	Not documented in Project survey
Racomitrium moss *Codriophorus depressus* (formerly *Racomitrium depressum*)	On rocks in montane streams.	S – FWI S – RRS S – UMP	Not documented in Project survey
Cryptomitrium tenerum[3/]	Forms small to locally extensive mats on bare, usually shaded and humid soil on hillsides, rock outcrops, and streambanks. In OR, between sea level and 1,000 feet. Root balls and cutbanks are favored habitat in forests.	D – RRS	Not documented in Project survey
White-mouthed Extinguisher-moss *Encalypta brevicollis*	Deep, rocky ravine.	D – RRS S – UMP	Not documented in Project survey
Candle snuffer moss *Encalypta brevipes*	Soil on ledges and in crevices on cliffs, reported from both igneous and siliceous substrates.	D – RRS S – UMP	No suitable habitat in survey area

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Banded cord-moss *Entosthodon fascicularis*	Seasonally wet, exposed soil in seeps or along intermittent streams. Usually hidden among grasses, other mosses, and litter. Known habitats: grassland, oak savanna, grassy balds, and rock outcrops. In OR, known at elevations below 3,000 feet.	S – RRS S – UMP	Not documented in Project survey
Braided frostwort *Gymnomitrion concinnatum*	On peaty soil of cliffs and rock outcrops, full exposure or shaded. In OR and WA, it has only been found in subalpine parkland areas.	S – UMP	Not documented in Project survey
Great mountain flapwort *Harpanthus flotovianus*	Wet places, often with Sphagnum.	D – FWI D – RRS S – UMP	Not documented in Project survey
Blandow's feather moss *Helodium blandowii*	Montane fens, usually with calcareous ground water.	D – FWI D – RRS D – UMP	Not documented in Project survey
Gillman's pawwort *Lophozia gillmanii*	Found on peaty soil, usually associated with cliffs or ledges. It is an obligate calciphile.	S – FWI S – UMP	Not documented in Project survey
Marsupella emarginata var. *aquatica*[3/]	Old growth forests. Grows in robust colonies attached to submerged rocks in partially shaded cold, flowing, cold perennial stream habitats. Known occurrence at Waldo Lake, Willamette National Forest in the Oregon Cascades.	S – UMP	Not documented in Project survey
Meesia moss *Meesia uliginosa*	Wet places, marshes and fens.	D – FWI D – RRS S – UMP	Not documented in Project survey
Orthodontium gracile	Occurs in old-growth or secondary growth redwood. May be found on the lower bark of trunks, below tree wounds, or downed redwood logs. Typically on redwood bark that has been burned or charred.	D – RSS	Not documented in Project survey
Translucent orthodontium *Orthodontium pellucens*	Forming dense cushions or mats on stumps, rotten logs and bark of living redwood trees, confined to redwood groves near the Pacific Ocean. Sometimes on charred wood, or below gaping wounds in trees. In OR, restricted to *Sequoia sempervirens* in extreme SW corner of the state.	D – RRS	No suitable habitat in survey area
Tuberous hornwort *Phymatoceros phymatodes*	On bare, mineral soil which remains moist until late spring or summer. From near sea level to 650 m elevation.	S – RRS	Not documented in Project survey
Dwarf rock haircap *Polytrichum sphaerothecium*	unknown	S – FWI S – UMP	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Bolander's scalemoss *Porella bolanderi*	On a variety of rock types (siliceous, calcareous, and metamorphic) and trunks of *Quercus, Umbellularia*, and *Acer macrophyllum*. In the Pacific Northwest, known elevations range from 500-3,000 feet.	D – RRS S – UMP	Not documented in Project survey
Blunt water moss *Pseudocalliergon trifarium* (formerly *Calliergon trifarium*)	Calcareous fens.	S – RRS D – FWI	No suitable habitat in survey area
Schistidium moss *Schistidium cinclidodonteum*	On wet or dry rocks or on soil in crevices of rocks and boulders, often along intermittent streams, at elevations of 5,000-11,000 feet.	S – FWI S – RRS	Not documented in Project survey
Schistostega pennata[3/]	Mineral soil in shaded pockets of overturned tree roots, often with shallow pools of standing water at the base of the root wad; attached to rock or mineral soil around the entrance to caves, old cellars, and animal burrows. Microhabitat requirements include dense shade, high humidity, and some source of reflection of light (i.e., a pool of water)	S – FWI S – RSS D – UMP	Not documented in Project survey
Alpine masterwort *Schofieldia monticola*	Terrestrial, on peaty soil under heather or beside small streams; strictly subalpine-alpine.	S – UMP	Not documented in Project survey
Purple-vased stink moss *Splachnum ampullaceum*	On old dung of herbivores.	D – FWI S – RRS S – UMP	Not documented in Project survey
Tetraphis geniculata[3/]	A moss that occurs in moist, coniferous forests with down logs; on the cut or broken ends or lower half of large (usually over 15" dbh), decay class 3, 4, and 5 rotted logs, or stumps, and occasionally on peaty banks in moist coniferous forests from sea level to subalpine elevations.	S – UMP	Not documented in Project survey
Tomentypnum moss *Tomentypnum nitens*	Medium to rich montane fens where it favors slightly elevated sites such as logs, stumps, or hummocks formed by *Vacccinium uliginosum* and *Betula glandulosa*. Elevations range from 5,000 to 6,000 feet.	D – FWI D – RRS D – UMP	Not documented in Project survey
Mucronleaf tortula moss *Tortula mucronifolia*	On soil or rock.	D – RRS	Not documented in Project survey
Asano's trematodon moss *Trematodon asanoi*	On moist bare soil along the edges of trails, streams and ponds in the subalpine zone. Soils usually have some organic content and are irrigated by meltwater from late-season snowbeds.	S – FWI S – UMP	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Tritomaria exsectiformis[3/]	Occurs in shady, cool, moist sites such as wet banks of riparian areas, spring heads, decaying logs and associated humus. Also on cliffs, ledges, and rock crevices covered with thin peaty acidic soils. In Oregon, it mostly occurs in peaty soils of mid-elevation cold water streams.	D – FWI S – RSS D – UMP	Not documented in Project survey
Fungi			
Albatrellus avellaneus	Presumed mycorrhizal with pine trees, known from Shore Acres in Coos County, in T26S, R14W, Sec. 17 SWNE along Cape Arago area.	D – RSS	Not documented in Project survey
Arcangeliella camphorata	Forms sporocarps beneath soil surface associated with various Pinaceae spp., particularly *Pseudotsuga menziesii* and *Tsuga heterophylla* from 600 ft. to 2,800 ft. elevation.	D – RSS	Not documented in Project survey
Chamonixia caespitosa	Forms sporocarps beneath the soil surface associated with various Pinaceae spp., particularly Abies amabilis and Tsuga sp. at high elevation and Picea sitchensis, Pseudotsuga menziesii, and Tsuga heterophylla in coastal forests.	D – RSS	Not documented in Project survey
*Cortinarius barlowensis (*syn. *Cortinarius azureus)*	Coastal to montane conifer forests up to at least 1,200 m elevation; late successional old-growth association; fruits in autumn.	D – UMP	Not documented in Project survey
Dermocybe humboldtensis	Stabilized dunes on roots of pine and huckleberry species and conglomerate rock and gravelly loam soil with Douglas-fir and ponderosa pine.	S – RSS S – UMP	Not documented in Project survey
Gastroboletus vividus	Associated with Abies magnifica and Tsuga mertensiana.	S – FWI D – RSS S – UMP	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Gymnomyces fragrans	Unknown	D – RRS S – UMP	Not documented in Project survey
Pseudorhizina californica (formerly *Gyromitra californica)*	Forest edges, disturbed sites.	D – FWI D – RSS D – UMP	Not documented in Project survey
Ramaria amyloidea	In humus or soil under Abies ssp., Douglas-fir, and western hemlock from September to October.	S – RSS D – UMP	Not documented in Project survey
Ramaria spinulosa var. *diminutiva*	Terrestrial under Pinaceae ssp. in October and November.	S – RSS S – UMP	Not documented in Project survey
Rhizopogon chamaleontinus	Found in association with the roots of Pseudotsuga menziesii and scattered Pinus lambertiana at 1,100 m elevation.	D – RSS	Not documented in Project survey
Rhizopogon ellipsosporus	Associated with roots of Douglas-fir and sugarpine in October.	D – RSS	Not documented in Project survey
Rhizopogon exiguus	Associated with the roots of Pseudotsuga menziesii and Tsuga heterophylla at 950 m elevation.	D – RSS S – UMP	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Rhizopogon inquinatus	Found in association with the roots of Pinus jeffreyi, Pseudotsuga menziesii and Tsuga heterophylla from 500 to 1,400 m elevation.	S – UMP	Not documented in Project survey
Stagnicola perplexa	Unknown	D – RSS S – UMP	Not documented in Project survey
Lichen			
Bryoria subcana	Grows on conifer bark in forests of coastal bays, streams, dune forests, and high precipitation ridges within 30 mi (50 km) of the ocean. Inhabits areas of high humidity, mostly in late-seral to old-growth stands.	S – RSS	Not documented in Project survey
Shield lichen *Heterodermia leucomelos*	On mossy hardwoods or rock faces with some light.	S – RRS	Not documented in Project survey
Leptogium cyanescens	Occurs in mixed conifer and Douglas-fir stands, and in maple and willow thickets in both riparian and upland habitats.	S – FWI S – RSS S – UMP	Not documented in Project survey
Lobaria linita	On trees, shrubs, mossy rocks or alpine sod. Montane to alpine.	S – RSS D – UMP	Not documented in Project survey
Pseudocyphellaria mallota[3]	Old conifers or understory hardwoods and shrubs in late successional forests.	D – UMP	Not documented in Project survey
Ramalina pollinaria	Bark and wood, usually in low elevation swamps.	S – RSS S – UMP	Not documented in Project survey
Woven spore lichen *Texosporium sancti-jacobi*	Arid to semi-arid shrub-steppe, grassland or savannah communities up to 1,000 m in elevation. It requires natural openings or gaps in arid vegetation that are not maintained by fire.	S – FWI	Not documented in Project survey
Vascular plants			

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
California maiden-hair *Adiantum jordanii*	Rocky areas in moist woods.	S – FWI D – RRS S – UMP	Not documented in Project survey
Peninsular onion *Allium peninsulare*	Dry open or wooded slopes and flats to 3,000 ft; valley grassland, foothill woodlands; March through June.	S – RRS	Not documented in Project survey
Crater Lake rock-cress *Arabis suffrutescens horizontalis*	High elevation open sites with pumice. Known sites in Crater Lake NP.	D – FWI S – RRS S – UMP	Not documented in Project survey
Gasquet (hairy) manzanita *Arctostaphylos hispidula*	Rocky serpentine soils or sandstone, open forests.	D – RRS	Outside of known (or probable) range
Shasta arnica *Arnica viscosa*	High elevation, open rocky sites; known in Deschutes, Klamath, Douglas Co, found at a few sites in wilderness along the Cascade Crest and on Pelican Butte.	D – FWI S – RRS D – UMP	Not documented in Project survey
Grass-fern *Asplenium septentrionale*	Grows on shady, moist, north faces of large rocks; only known in North Umpqua.	D – FWI D – RRS D – UMP	Not documented in Project survey
Lemmon's milk-vetch *Astragalus lemmonii*	Great Basin scrub, meadows and seeps, marshes and swamps (lake shores). NOTE: According to 10/23/2012 plant meeting in Corvallis, *H. lemmonii* should be *H. cooperi* (*H. lemmonii* not in OR).	D – FWI	Not documented in Project survey
Bensonia *Bensoniella oregana*	Wet meadows and moist streamside sites in pre-Cretaceous metasedimentary rock at elevations above 4,000 feet.	D – RRS	The single site observed during surveys will be avoided.
Crenulate moonwort (Crenulate grape-fern) *Botrychium crenulatum*	Marshes, meadows above 4,000 feet	S – FWI	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Brewer's reedgrass *Calamagrostis breweri*	Restricted to subalpine habitats in a narrow elevation range in Oregon. Most populations in Oregon occur between 5,000-6,000 feet. Usually found in moist meadows with limited vegetative competition.	S – UMP	Not documented in Project survey
Greene's mariposa-lily *Calochortus greenei*	Grows on dry, bushy hillsides in southern Jackson County.	S – FWI	Not documented in Project survey
Howell's camassia *Camassia howellii*	Grassy wet meadows, swampy ground, and transitional areas between wet meadows and coniferous woodlands.	D – RRS	No suitable habitat in survey area
Slender-flowered evening primrose *Camissonia graciliflora*	Open rocky grassy and shrublands, usually clay soils.	D – RRS	Not documented in Project survey
Capitate sedge *Carex capitata*	Wet places.	D – FWI D – RRS	Not documented in Project survey
Bristly sedge *Carex comosa*	Wet places.	S – RRS	Not documented in Project survey
Cordilleran sedge *Carex cordillerana*	Naturally disturbed, rocky slopes with organic layer and leaf litter in mesic mixed forests, or disturbed, open, grassy slopes; 500-2,400 m.	D – FWI	Not documented in Project survey
Crawford's sedge *Carex crawfordii*	Moist or wet places.	S – RRS S – UMP	Not documented in Project survey
Lesser panicled sedge *Carex diandra*	Meadows.	D – FWI S – UMP	Not documented in Project survey
A sedge *Carex klamathensis*	Chaparral, cismontane woodland, meadows and seeps.	D – RRS	Not documented in Project survey
Slender sedge *Carex lasiocarpa americana*	Bogs, shallow water.	D – FWI S – UMP	Not documented in Project survey
Spikenard sedge *Carex nardina*	Exposed arctic and alpine tundra, usually calcareous cliffs, rocky slopes, ridges, and summits; 50-3,300 m.	D – UMP	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Sierra nerved sedge *Carex nervina*	Moist to wet places.	D – RRS	Not documented in Project survey
Russet sedge *Carex saxatilis*	Fens, bogs, wet tundra, roadside ditches, shores of lakes, ponds, and slow moving streams, often in shallow water, 1-3,700 m.	S – FWI	Not documented in Project survey
Native sedge *Carex vernacula*	Moist alpine tundra, moist forest openings just below treeline.	D – FWI S – UMP	Not documented in Project survey
Green-tinged paintbrush *Castilleja chlorotica*	Grows on dry gravelly or sandy slopes; Elevation 6,000 – 8,000 feet; late June through mid-August. Found in shrub openings on slopes and ridges; On FWI found at one site near northeast corner of the Forest.	D – FWI	No suitable habitat in survey area
Split-hair paintbrush *Castilleja schizotricha*	Decomposed granite or marble at high elevations.	D – RRS	No suitable habitat in survey area
Coville's lip-fern *Cheilanthes covillei*	Rock outcrops, cliffs.	D – RRS	Not documented in Project survey
Fee's lip-fern *Cheilanthes feei*	Calcareous cliffs and ledges, usually on limestone or sandstone; 100-3,800 m.	S – FWI	Not documented in Project survey
Coastal lip-fern *Cheilanthes intertexta*	Rock outcrops, cliffs.	S – FWI S – RRS	Not documented in Project survey
Narrow-leaved amole *Chlorogalum angustifolium*	Clay soils in dry grassland.	S – RRS	Not documented in Project survey
Oregon timwort *Cicendia quadrangularis*	Openings.	D – RRS	Not documented in Project survey
Mt. Mazama collomia *Collomia mazama*	Dry woods at high elevations; July and August; True fir/lodgepole pine forest, meadows, and meadow edges; On FWI, found in Lost Creek, Horse Creek, Rock Creek and Cherry Creek drainages, Klamath RD.	D – UMP D – RRS D – FWI	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Milo baker's cryptantha *Cryptantha milo-bakeri*	Rocky or gravelly soils in conifer openings, chaparral or oak woodlands.	D – RRS	Not documented in Project survey
Baker's cypress *Cupressus bakeri*	Scattered on dry wooded slopes, usually in serpentine soil.	D – RRS	Not documented in Project survey
Short-pointed cyperus *Cyperus acuminatus*	Wet, low places in valley and lowlands, edges of temporary pools, ponds, streams, ditches	S – RRS	Not documented in Project survey
Red larkspur *Delphinium nudicaule*	Rocky openings, often in talus on moist slopes.	D – RRS	Not documented in Project survey
Few-flowered bleedingheart *Dicentra pauciflora*	Openings in coniferous forests, in volcanic and granitic soils; 1,200-2,700 m.	D – RRS	Not documented in Project survey
Howell's whitlow-grass *Draba howellii*	Rocky summits, cracks in granite walls, rock crevices; 1,900-2,700 m.	D – RRS	Not documented in Project survey
Short seeded waterwort *Elatine brachysperma*	Occurs almost always under natural conditions in wetlands.	S – FWI S – UMP	Not documented in Project survey
Bolander's spikerush *Eleocharis bolanderi*	Fresh, often summer-dry meadows, springs, seeps, stream margins; 1,000–3,400 m.	D – FWI	Not documented in Project survey
Oregon willow herb *Epilobium oreganum*	Grows in bogs at low elevations. Known only from Josephine County.	D – RRS	No suitable habitat in survey area
Siskiyou willow herb *Epilobium siskiyouense*	Scree and talus on Serpentine ridges.	D – RRS	No suitable habitat in survey area
Golden fleece *Ericameria arborescens*	Dry foothill slopes, in chaparral; 90–2,000 m.	D – RRS	Not documented in Project survey
Siskiyou daisy *Erigeron cervinus*	Rocky streamsides.	D – RRS	Not documented in Project survey
Cliff (rock) daisy *Erigeron petrophilus*	Rocky foothills to montane forest.	D – RRS	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Lobb's buckwheat *Eriogonum lobbii*	Gravelly to rocky or talus slopes, mixed grassland, buckbrush, manzanita, and sagebrush communities, montane, subalpine, or alpine conifer woodlands.	D – RRS	Not documented in Project survey
Prostrate buckwheat *Eriogonum prociduum*	Areas of barren rocky or gravelly volcanic soils within juniper or sagebrush habitat.	D – FWI	Not documented in Project survey
Green buckwheat *Eriogonum umbellatum* var. *glaberrimum*	Sandy to gravelly slopes, sagebrush communities, aspen and montane conifer woodlands; 1,600-2,300 m.	D – FWI	Not documented in Project survey
Howell's adder's tongue *Erythronium howellii*	Found in open woods primarily in the upper Illinois River basin, mostly in serpentine soil; April and May.	D – RRS	Outside of known (or probable) range
Gold poppy *Eschscholzia caespitosa*	Grows on dry, brushy slopes and flat areas, mostly along roadsides; known in southern Douglas County; March through early June.	S – RRS	No suitable habitat in survey area
Umpqua swertia *Frasera umpquaensis*	Elevations 4500 – 6500 feet in conifer forests, in damp, shaded or sometimes open environments; June through August.	D – RRS D – UMP	Not documented in Project survey
Warner Mt. bedstraw *Galium serpenticum warnerense*	Meadows in subalpine forest.	D – FWI	Not documented in Project survey
Newberry's gentian *Gentiana newberryi newberryi*	High alpine meadows of the Cascade Mountains; wet meadows and meadow edges, generally 5,000 ft and above; August and September.	S – RRS S – UMP D – FWI	Not documented in Project survey
Elegant gentian *Gentiana plurisetosa*	Meadows in lodgepole forest, red fir forest, or yellow pine forest.	D – RRS	Not documented in Project survey
Waldo gentian *Gentiana setigera*	Meadows in yellow pine forest, red fir forest, wetland-riparian. Almost always under natural conditions in wetlands.	D – RRS	Not documented in Project survey
Beautiful stickseed *Hackelia bella*	Forest openings, roadsides.	S – RRS	Not documented in Project survey
Salt heliotrope *Heliotropium curassavicum*	Moist to dry saline soils.	S – FWI	No suitable habitat in survey area
Shaggy hawkweed *Hieracium horridum*	Rocky places.	S – RRS	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Henderson's horkelia *Horkelia hendersonii*	Endemic to summits of a few granite peaks in southern Jackson County.	D – RRS	No suitable habitat in survey area
Three-toothed horkelia *Horkelia tridentata tridentata*	Montane forests, associated with conifer trees.	D – RRS	Not documented in Project survey
California globe-mallow *Iliamna latibracteata*	Coastal ranges in Coos and Douglas counties; June and July.	D – RRS D – UMP	Not documented in Project survey
Shockley's ivesia *Ivesia shockleyi*	Subalpine forest, bristle-cone pine forest, alpine fell-fields.	D – FWI	Not documented in Project survey
Fragrant kalmiopsis *Kalmiopsis fragrans*	Cliffs and rock outcrops, known only from North Umpqua River.	D – UMP	Not documented in Project survey
Bush beardtongue *Keckiella lemmonii*	Conifer forests and chaparral of coastal and inland mountain ranges.	D – RRS	Not documented in Project survey
Columbia lewisia *Lewisia columbiana* var. *columbiana*	Reported on three mountains in the southeastern portion of Douglas County; May through July.	D – UMP	Not documented in Project survey
Lee's lewisia *Lewisia leana*	Grows on high elevation serpentine ridges; late May through August.	D – RRS S – UMP	Not documented in Project survey
Slender meadow-foam *Limnanthes gracilis gracilis*	Found in Douglas, Jackson, and Josephine counties in very wet areas (early spring) and often in serpentine soil; March through May. Vernal pools.	S – RRS	Not documented in Project survey
Aristulate lipocarpha *Lipocarpha aristulata*	Wet soil at an elevation of 100 to 400 m. In Washington, has been found along shorelines and islands below high water on silty substrates.	S – FWI	Not documented in Project survey
Englemann's desert-parsley *Lomatium engelmannii*	Chaparral, red fir forest, yellow pine forest.	D – RRS	No suitable habitat in survey area

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Stipuled trefoil *Lotus stipularis*	Open forests, chaparral, disturbed sites.	D – RRS	Not documented in Project survey
Mt. Ashland lupine *Lupinus lepidus ashlandensis*	Sandy or gravelly soils at low to alpine elevations.	D – RRS	No suitable habitat in survey area
Tracy's lupine *Lupinus tracyi*	Dry open montane forest.	D – RRS	Not documented in Project survey
Bog club-moss *Lycopodiella inundata*	Bogs, muddy depressions, and pond margins. On FWI one site in Yoss Creek drainage on Chiloquin RD.	D – FWI	Not documented in Project survey
White meconella (fairy poppy) *Meconella oregana*	Grows in open areas that are wet in the spring at low elevations. Known from sites in the Willamette Valley and the Columbia Gorge.	S – RRS	Not documented in Project survey
Bolander's monkeyflower *Mimulus bolanderi*	Openings in chaparral, burns and disturbed areas. Applegate Valley.	D – RRS	Not documented in Project survey
Congdon's monkeyflower *Mimulus congdonii*	Openings in oak woodland and chaparral. Applegate Valley.	S – RRS	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Disappearing monkeyflower *Mimulus evanescens*	Vernally moist sites along perennial and intermittent streams; receding margins of lakes, ponds, and reservoirs within juniper/sagebrush habitats.	D – FWI	No suitable habitat in survey area
Tri-colored monkeyflower *Mimulus tricolor*	Grows at low elevations in clay soil, preferring vernal pools; scattered in Klamath County; late May through June.	D – FWI	Not documented in Project survey
Annual dropseed *Muhlenbergia minutissima*	Pinyon-juniper woodland, sagebrush scrub, yellow pine forest, wetland-riparia; between 4,000 and 7,500 feet.	S – FWI	Not documented in Project survey
Slender nemacladus *Nemacladus capillaris*	Dry slopes, burned areas.	S – RRS	Not documented in Project survey
Adder's-tongue *Ophioglossum pusilum*	Open fens, wet meadows, grassy slopes, roadside ditches.	D – RRS D – UMP	Not documented in Project survey
Coffee fern *Pellaea andromedifolia*	Rock outcrops, cliffs.	S – RRS D – UMP	Not documented in Project survey
Bird's-foot fern *Pellaea mucronata* m*ucronata*	Rocky dry openings.	S – RRS	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Blue-leaved penstemon *Penstemon glaucinus*	Openings in mid to high elevation pine, fir, and mountain hemlock communities. Well-drained volcanic soils along rocky points and ridges.	D – FWI	Not documented in Project survey
Red-rooted yampah *Perideridia erythrorhiza*	Moist meadows, forest edges below 4,500 ft.	D – FWI D – RRS S – UMP	Not documented in Project survey
Siskiyou phacelia *Phacelia leonis*	Serpentine forests.	D – RRS	Not documented in Project survey
American pillwort *Pilularia americana*	Aquatic fern in shallow ponds or temporary pools.	S – FWI S – RRS	Not documented in Project survey
Whitebark pine *Pinus albicaulis*	Subalpine forests.	D – FWI D – RRS D – UMP	Not documented in Project survey
Coral seeded allocarya *Plagiobothrys figuratus corallicarpus*	Low elevation meadows and moist clearings and fields.	S – RRS	Not documented in Project survey
Greene's popcorn flower *Plagiobothrys greenei*	Vernal pools.	S – RRS	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Desert allocarya *Plagiobothrys salsus*	Playas in alkali sink, wetland-riparian.	S – FWI	Not documented in Project survey
Timber bluegrass *Poa rhizomata*	Dry Douglas-fir/ponderosa pine forests.	S – RRS S – UMP	Not documented in Project survey
Profuse-flowered mesa mint *Pogogyne floribunda*	Vernal pools, seasonal lakes.	S – FWI	Not documented in Project survey
California sword-fern *Polystichum californicum*	Creek banks and canyons in redwoods and mixed evergreen forests.	S – RRS D – UMP	Not documented in Project survey
Rafinesque's pondweed *Potamogeton diversifolius*	Shallow water, ditches, ponds, lakes.	S – FWI	Not documented in Project survey
California chicory *Rafinesquia californica*	Chaparral, recent burns, in the Applegate Valley.	S – RRS	Not documented in Project survey
Redberry *Rhamnus ilicifolia*	Chaparral in Applegate Valley.	D – RRS	Not documented in Project survey
Straggly gooseberry *Ribes divaricatum pubiflorum*	Coastal bluffs, forest edges; 0-1,500 m.	S – RRS	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Thompson's mistmaiden *Romanzoffia thompsonii*	Sunny, vernally wet mossy rocks.	D – RRS D – UMP	Not documented in Project survey
Columbia cress *Rorippa columbiae*	Along intermittent and perennial streams and lakeshores: banks, sandbars, vernal pools, lakebeds, and ditches.	D – FWI S – RRS	Not documented in Project survey
Lowland toothcup *Rotala ramosior*	Open, wet gravelly soil around ponds (1.5-133 m in western Oregon).	S – FWI S – UMP	Not documented in Project survey
Joint-leaved saxifrage *Saxifragopsis fragarioides*	Grows on dry cliffs in the high Siskiyou Mountains.	D – RRS	Not documented in Project survey
Scheuchzeria *Scheuchzeria palustris americana*	Grows in ponds and along streams in Oregon Cascades.	D – FWI D – RRS D – UMP	Not documented in Project survey
Water clubrush *Schoenoplectus subterminalis* (formerly *Scirpus subterminalis*)	Wetlands and bogs.	D – FWI D – RRS D – UMP	Not documented in Project survey
Drooping bulrush *Scirpus pendulus*	Marshes, wet meadows, ditches.	D – RRS	Not documented in Project survey
California fetid adderstongue *Scoliopus bigelovii*	Redwood and coastal coniferous forests, mossy mountain stream banks, shaded slopes; 0-500 m.	D – RRS	Not documented in Project survey
Rogue river stonecrop *Sedum moranii*	Steep south to west facing slopes and rock outcrops; 200-275 m.	D – RRS	Not documented in Project survey
Verrucose sea-purslane *Sesuvium verrucosum*	Valley grassland, coastal sage scrub, alkali sink, wetland riparian.	S – FWI	Not documented in Project survey
Coast checkermallow *Sidalcea malviflora patula*	Open Coastal Forest.	D – RRS	Not documented in Project survey
Bolander's catchfly *Silene hookeri bolanderi*	Oak and douglas-fir woodlands (100-1,000 m).	D – RRS	Not documented in Project survey
Parish's horse-nettle *Solanum parishii*	Chaparral, dry conifer openings, recent burns.	D – RRS	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Western sophora *Sophora leachiana*	Dry, open areas, open mixed woodlands, roadcuts and clearcuts; 140-460 m.	D – RRS	Not documented in Project survey
Common jewel flower *Streptanthus glandulosus*	Serpentine areas. (Note: this source lists the subspecies *S. g. josephinensis* as occurring in Oregon.)	S – RRS	Not documented in Project survey
Howell's streptanthus *Streptanthus howellii*	Dry, serpentine slopes, mixed evergreen forests, open pine woods or brushy areas; 485-1,220 m.	D – RRS	Not documented in Project survey
Howell's tauschia *Tauschia howellii*	Granitic gravel ridgetops above 1,830 m	D – RRS	No suitable habitat in survey area
Short-podded thelypody *Thelypodium brachycarpum*	Alkaline flats, lake margins in shrub steppe and near edges of pine forests.	D – FWI	No suitable habitat in survey area
Siskiyou trillium *Trillium kurabayashii*	Rich, moist conifer-hardwood forest, slopes, especially lower slopes, predominantly deciduous flat woods along streams, edges of Sequoia groves, and alder, vine maple, and fern thickets along streams, especially older, higher flood terraces, not the lowest and wettest; at higher elevations, both in forests and in open grassy meadows with scattered oak trees.	D – RRS	Not documented in Project survey
Lesser bladderwort *Utricularia minor*	Shallow water.	D – FWI D – RRS D – UMP	Not documented in Project survey
Northern bladderwort *Utricularia ochroleuca*	Shallow water on Shagnum mats.	S – FWI S – UMP	Not documented in Project survey
Western bog violet *Viola primulifolia occidentalis*	Serpentine bogs.	D – RRS	No suitable habitat in survey area
Dotted water-meal *Wolffia borealis*	Freshwater ponds and slow flowing ditches in which water has somewhat high levels of organic material. Occurs in natural ponds as well as in log and sewage treatment ponds; 107-460 m.	S – UMP	Not documented in Project survey
Columbia water-meal *Wolffia columbiana*	Free floating in quiet water.	S – RRS S – UMP	Not documented in Project survey

Table A-3: Forest Service Sensitive Plant (Vascular and Non-Vascular) Species Not Expected to be Impacted by the Project			
Common Name and/or *Scientific Name*	**Expected Habitat[1/]**	**Documented or Suspected Occurrence[2/]**	**Reason for Determination**
Small-flowered death camas *Zigadenus fontanus*	Meadows	S – RRS	Not documented in Project survey

1/ ORNHIC 2006; Eastman 1990; Pojar and MacKinnon 1994; Hickman 1993; BLM 2004; Hickman 1993; Hitchcock et al. 1969; Castellano et al. 1999; Arora 1986; Christy and Wagner 1996; Lawton 1971; Norris and Shevok 2004a and b; McCune and Geiser 1997; Brodo et al. 2001, ORBIC 2013.
2/ Occurrence Key:
National Forest: FWI = Winema National Forest, RRS = Rogue River National Forest, UMP = Umpqua National Forest
D = Documented within Forest Service Management Area
S = Suspected within Forest Service Management Area
3/ No common name found for this species.

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Appendix B: Summary of Construction and Operation-Related Disturbance to Each National Forest

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Table B-1. Summary of Construction-Related Disturbance (acres[/]) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Umpqua National Forest.

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities – Klamath Compressor Station	Subtotals					Percent of Total
			Construction ROW	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Habitat Type*	
Forest-Woodland	Westside Lowland Conifer-Hardwood Forest	LO [1/]														
		MS [2/]														
		CR [3/]														
	Montane Mixed Conifer Forest	LO [1/]														
		MS [2/]														
		CR [3/]														
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO [1/]	77.31		11.44	32.59		0.01								
		MS [2/]	22.27		11.13	7.62		0.57			121.35	41.58	22.65	185.58	*100*	*87.7*
		CR [3/]	17.24		3.92	1.49										
	Ponderosa Pine Forest and Woodland	LO [1/]														
		MS [2/]														
		CR [3/]														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO [1/]														
		MS [2/]														
		CR [3/]														
	Western Juniper and Mountain Mahogany Woodlands	LO [1/]														
		MS [2/]														
		CR [3/]														
	Subtotal Forest-Woodland by Age Class	LO [1/]	77.31		11.44	32.59		0.01							*65.4*	
		MS [2/]	22.27		11.13	7.62					121.35	41.58	22.65	185.58	*22.4*	87.7
		CR [3/]	17.24		3.92	1.49		0.57							*12.2*	
	Subtotal Forest-Woodland		**116.81**		**26.49**	**41.70**		**0.58**			**121.35**	**41.58**	**22.65**	**185.58**	***100***	***87.7***
	Percent of All Forest-Woodland		***62.9***		***14.3***	***22.5***		***0.3***			***65.4***	***22.4***	***12.2***	***100.0***		
Grasslands-Shrubland	Shrub-Steppe															
	Westside Grasslands															
	Eastside Grasslands															
	Subtotal Grasslands-Shrubland															
Wetland/Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands		0.04		0.04									0.08	*100.00*	*0.04*
	Herbaceous Wetlands		0.00											0.00	*0.0*	*0.0*
	Subtotal Wetland / Riparian		**0.04**		**0.04**									**0.08**	***100.00***	***0.04***
Agriculture	Agriculture, Pastures, and Mixed Environs															
	Subtotal Agriculture															
Developed/Barren	Urban and Mixed Environs				7.74		4.31							12.05	*46.9*	*5.7*
	Beaches															
	Roads		6.96		6.23	0.42	0.02							13.63	*53.1*	*6.4*

Table B-1. Summary of Construction-Related Disturbance (acres[/]) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Umpqua National Forest.

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities – Klamath Compressor Station	Subtotals					
			Construction ROW	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of* Habitat *Type*	*Percent of Total*
Subtotal Developed / Barren			**6.96**		**13.97**	**0.42**	**4.32**							**25.68**	***100***	***12.1***
Open Water	Open Water – Lakes, Rivers, and Streams		0.25		0.12									0.37	*100*	*0.2*
	Bays and Estuaries															
Subtotal Open Water			**0.25**		**0.12**									**0.37**	***100***	***0.2***
Subtotal Non-Forest			**7.25**		**14.13**	**0.42**	**4.32**							**26.13**		***12.3***
Percent of All Non-Forest			**27.7**		**54.0**	**1.6**	**16.5**							***100.0***		
Project Total			***124.07***		***40.62***	***42.12***	***4.32***	***0.58***			**121.35**	**41.58**	**22.65**	**211.71**		
Percent of Pipeline Facilities			***58.6***		***19.2***	***19.9***	***2.0***	***0.3***			***57.3***	***19.6***	***10.7***	***100.0***		

1/ The "Late Successional and Old-Growth" category (LO) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
2/ The "Mid-Seral" category (MS) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
3/ The "Clearcut or Regenerating Forest" category (CR) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years). Forest areas in this category are divided into forest vegetation types based on their potential to become those types of forests.
4/ Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. Minimal soil disturbance would occur. A rubber-tired hoe would be utilized to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge.
5/ Portions of some of the Permanent Access Roads (PARs) are located within the construction ROW and there is some duplication in the acreage calculations.

Table B-2. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Umpqua National Forest.

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities						Permanent Easement (50-foot)	Aboveground Facilities																		Total Operation Impacts by Habitat Type[4/]
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type		Jordan Cove MS & BVA #1	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Forest-Woodland	Westside Lowland Conifer-Hardwood Forest	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
	Montane Mixed Conifer Forest	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO [2/]	23.52		23.52	7.26	5.58	**36.35**	*39.44*																			**36.35**
		MS [3/]	7.26						*12.07*																			
		CR [4/]	5.58						*9.29*																			
	Ponderosa Pine Forest and Woodland	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
	Western Juniper and Mountain Mahogany	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
Subtotal Forest-Woodland by Age Class		***LO [2/]***	***23.52***		***23.52***	***7.26***	***5.58***	***36.35***	***39.44***																			***23.52***
		MS [3/]	***7.26***						***12.07***																			***7.26***
		CR [4/]	***5.58***						***9.29***																			***5.58***
Subtotal Forest-Woodland			***36.35***		***23.52***	***7.26***	***5.58***	***36.35***	***60.80***																			**36.35**
Grasslands-Shrubland	Shrub-steppe																											
	Westside Grasslands																											
	Eastside Grasslands																											
Subtotal Grasslands-Shrubland																												
Wetland-Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands		0.01					0.01	*0.01*																			**0.01**
	Herbaceous Wetland																											
Subtotal Wetland/Riparian			**0.01**					**0.01**	***0.01***																			**0.01**
Agriculture	Agriculture, Pastures, and Mixed Environs																											
Subtotal Agriculture																												

Table B-2. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Umpqua National Forest.

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities						Permanent Easement (50-foot)	Aboveground Facilities																		Total Operation Impacts by Habitat Type[4/]
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type		Jordan Cove MS & BVA #1	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Developed / Barren	Urban and Mixed Environs																											
	Beaches																											
	Roads		2.82					2.82	*4.48*																			**2.82**
Subtotal Developed / Barren			**2.82**					**2.82**	***4.48***																			**2.82**
Open Water	Open Water – Lakes, Rivers, and Streams		0.11					0.11	*0.17*																			**0.11**
	Bays and Estuaries																											
Subtotal Open Water			**0.11**					**0.11**	***0.17***																			**0.11**
Subtotal Non-Forest			***2.93***					***2.93***	***4.66***																			**2.93**
Project Total			**39.28**		**23.52**	**7.26**	**5.58**	**39.28**	**65.46**																			**39.28**

1/ The "Late Successional and Old-Growth" category (LO) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
2/ The "Mid-Seral" category (MS) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
3/ The "Clearcut or Regenerating Forest" category (CR) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years).
4/ Total Operation Impacts by Habitat Type includes the 30-foot maintenance corridor, permanent access roads, and only aboveground facilities with a meter station or compressor station (mainline block valves located within the 30-foot maintenance corridor).
General: If percentages were less than 1/100ths, they were not included in the table.
Columns and rows do not necessarily sum correctly due to rounding.

Table B-3. Summary of Construction-Related Disturbance (acres to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Rogue River National Forest.

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities – Klamath Compressor Station	Subtotals					
			Construction ROW	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Habitat Type*	*Percent of Total*
Forest-Woodland	Westside Lowland Conifer-Hardwood Forest	LO [1/]														
		MS [2/]														
		CR [3/]														
	Montane Mixed Conifer Forest	LO [1/]	11.97		0.69	4.07					16.73	10.45	45.99	73.17	*30.4*	*25.8*
		MS [2/]	6.71		0.17	3.57										
		CR [3/]	22.74		11.18	11.65		0.42								
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO [1/]	59.38		5.56	31.33		0.25			96.53	7.47	63.37	167.37	*69.6*	*59.0*
		MS [2/]	5.58		0.23	1.65										
		CR [3/]	37.44		11.59	14.10		0.24								
	Ponderosa Pine Forest and Woodland	LO [1/]														
		MS [2/]														
		CR [3/]														
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO [1/]														
		MS [2/]														
		CR [3/]														
	Western Juniper and Mountain Mahogany Woodlands	LO [1/]														
		MS [2/]														
		CR [3/]														
Subtotal Forest-Woodland by Age Class		LO [1/]	71.35		6.25	35.40		0.25			113.26	17.92	109.36	240.53	*47.1*	84.8
		MS [2/]	12.29		0.40	5.23		0.0							*7.4*	
		CR [3/]	60.18		22.77	25.74		0.66							*45.5*	
Subtotal Forest-Woodland			**143.83**		**29.43**	**66.37**		**0.91**			**113.26**	**17.92**	**109.36**	**240.53**	***100.00***	***84.8***
Percent of All Forest-Woodland			***59.8***		***12.2***	***27.6***		***0.4***			***47.1***	***7.4***	***45.5***	***100***		
Grassland-scrubland	shrub-steppe		2.19		4.56	0.62								7.37	*69.5*	*2.6*
	Grasslands (West of Cascades)		1.45		1.08	0.32								2.85	*26.9*	*1.0*
	Grasslands (East of Cascades)		0.29		0.10									0.38	*3.6*	*0.1*
Subtotal Grasslands-Shrubland			**3.93**		**5.73**	**0.95**								**10.61**	***100***	***3.7***
Wetland / Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	LO [1/]														
		MS [2/]														
		CR [3/]														
	Herbaceous Wetlands															
Subtotal Wetland / Riparian																
Agriculture	Agriculture, Pastures, and Mixed Environs															

Table B-3. Summary of Construction-Related Disturbance (acres to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Rogue River National Forest.

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities – Klamath Compressor Station	Subtotals					Percent of Total
			Construction ROW	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Habitat Type*	
Subtotal Agriculture																
Developed Barren	Urban and Mixed Environs				10.76		4.91							15.67	*52.6*	*5.5*
	Beaches				1.54									1.54	*5.2*	*0.5*
	Roads		9.44		3.15	2.45								12.58	*42.2*	*4.4*
Subtotal Developed / Barren			**9.44**		**15.45**	**2.45**	**4.91**							**29.79**	***100***	***10.5***
Open Water	Open Water – Lakes, Rivers, and Streams		0.13			0.09								0.22	*100*	*0.1*
	Bays and Estuaries															
Subtotal Open Water			**0.13**			**0.09**								**0.22**	***100***	*0.1*
Subtotal Non-Forest			**13.50**		**21.18**	**3.49**	**4.91**							**43.07**		***15.2***
Percent of All Non-Forest			***31.3***		***49.2***	***8.1***	***11.4***							***100.00***		
Project Total			***157.32***		***50.61***	***69.86***	***4.91***	**0.91**			**113.26**	**17.92**	**109.36**	**283.60**		
Percent of Pipeline Facilities			***55.5***		***17.8***	***24.6***	***1.7***	***0.3***			***39.9***	***6.3***	***38.6***	***100***		

1/ The "Late Successional and Old-Growth" category (LO) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
2/ The "Mid-Seral" category (MS) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
3/ The "Clearcut or Regenerating Forest" category (CR) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years). Forest areas in this category are divided into forest vegetation types based on their potential to become those types of forests.
4/ Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. Minimal soil disturbance would occur. A rubber-tired hoe would be utilized to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge.
5/ Portions of some of the Permanent Access Roads (PARs) are located within the construction ROW and there is some duplication in the acreage calculations.

Table B-4. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Rogue River National Forest

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities						Permanent Easement (50-foot)	Aboveground Facilities																		Total Operation Impacts by Habitat Type[4/]
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type		Jordan Cove MS & BVA #1	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Forest-Woodland	Westside Lowland Conifer-Hardwood Forest	LO [1/]																										
		MS [2/]																										
		CR [3/]																										
	Montane Mixed Conifer Forest	LO [1/]	3.97		3.97	2.39	7.22	13.59	6.57																			**13.59**
		MS [2/]	2.39						3.90																			
		CR [3/]	7.22						12.04																			
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO [1/]	19.10		19.10	1.56	11.95	32.61	31.59																			**32.61**
		MS [2/]	1.56						2.62																			
		CR [3/]	11.95						19.82																			
	Ponderosa Pine Forest and Woodland	LO [1/]																										
		MS [2/]																										
		CR [3/]																										
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO [1/]																										
		MS [2/]																										
		CR [3/]																										
	Western Juniper and Mountain Mahogany Woodlands	LO [1/]																										
		MS [2/]																										
		CR [3/]																										
	Subtotal Forest-Woodland by Age Class	***LO [1/]***	***23.08***		***23.08***	***3.95***	***19.17***	***46.20***	***38.16***																			***23.08***
		MS [2/]	***3.95***						***6.52***																			***3.95***
		CR [3/]	***19.17***						***31.86***																			***19.17***
	Subtotal Forest-Woodland		**46.20**		**23.08**	**3.95**	**19.17**	**46.20**	***76.54***																			**46.20**
Grasslands-shrubland	Shrub-steppe		0.66					0.66	1.08																			**0.66**
	Westside Grasslands		0.50					0.50	0.83																			**0.50**
	Eastside Grasslands		0.09					0.09	0.15																			**0.09**
	Subtotal Grasslands-Shrubland		**1.25**					**1.25**	***2.05***																			**1.25**
Wetland/ Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	LO [1/]																										
		MS [2/]																										
		CR [3/]																										
	Herbaceous Wetlands																											
	Subtotal Wetland/Riparian																											
Agriculture	Agriculture, Pastures, and Mixed																											

Table B-4. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Rogue River National Forest

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities						Permanent Easement (50-foot)	Aboveground Facilities																		Total Operation Impacts by Habitat Type[4]
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type		Jordan Cove MS & BVA #1	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
	Environs																											
Subtotal Agriculture																												
Developed / Barren	Urban and Mixed Envions																											
	Beaches																											
	Roads		2.41					2.41	*4.50*																			**2.41**
Subtotal Developed / Barren			**2.41**					**2.41**	***4.50***																			**2.41**
Open Water	Open Water – Lakes, Rivers, and Streams		0.04					0.04	*0.06*																			**0.04**
	Bays and Estuaries																											
Subtotal Open Water			**0.04**					**0.04**	***0.06***																			**0.04**
Subtotal Non-Forest			**3.69**					**3.69**	***6.61***																			**3.69**
Project Total			**49.89**		**23.08**	**3.95**	**19.17**	**49.89**	**83.15**																			**49.89**

1/ The "Late Successional and Old-Growth" category (LO) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
2/ The "Mid-Seral" category (MS) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
3/ The "Clearcut or Regenerating Forest" category (CR) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years).
4/ Total Operation Impacts by Habitat Type includes the 30-foot maintenance corridor, permanent access roads, and only aboveground facilities with a meter station or compressor station (mainline block valves located within the 30-foot maintenance corridor).
General: If percentages were less than 1/100ths, they were not included in the table.
-Columns and rows do not necessarily sum correctly due to rounding.

Table B-5. Summary of Construction-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Winema National Forest

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities – Klamath Compressor Station	Subtotals					Percent of Total
			Construction ROW	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements)[5]	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Habitat Type*	
Forest-Woodland	Westside Lowland Conifer-Hardwood Forest	LO [1/]														
		MS [2/]														
		CR [3/]														
	Montane Mixed Conifer Forest	LO [1/]	5.76		0.53	2.95					9.25	3.64	21.38	34.27	*39.1*	*37.2*
		MS [2/]	2.43		0.29	0.92										
		CR [3/]	14.62		3.54	3.23										
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO [1/]	28.92		4.11	2.56					35.60	7.48	10.39	53.47	*60.9*	*58.0*
		MS [2/]	5.65		1.10	0.73										
		CR [3/]	8.67		0.62	1.10										
	Ponderosa Pine Forest and Woodland	LO [1/]											0.01	0.01	*0.0*	*0.0*
		MS [2/]														
		CR [3/]			0.01											
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO [1/]														
		MS [2/]														
		CR [3/]														
	Western Juniper and Mountain Mahogany Woodlands	LO [1/]														
		MS [2/]														
		CR [3/]														
Subtotal Forest-Woodland by Age Class		LO [1/]	34.68		4.64	5.51					44.84	11.12	31.79	87.75	*51.1*	95.2
		MS [2/]	8.07		1.40	1.65									*12.7*	
		CR [3/]	23.29		4.17	4.33									*36.2*	
Subtotal Forest-Woodland			**66.05**		**10.21**	**11.49**					**44.84**	**11.12**	**31.79**	**87.75**	***100.0***	***95.2***
Percent of All Forest-Woodland			***75.3***		***11.6***	***13.1***					***51.1***	***12.7***	***36.2***	***100***		
Grasslands-Shrubland	Shrub-steppe															
	Westside Grasslands															
	Eastside Grasslands		0.69		0.22	0.0								0.91	*100.0*	*1.0*
Subtotal Grasslands-Shrubland			**0.69**		**0.22**	**0.0**								**0.91**	*100.0*	***1.0***
Wetland / Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	LO [1/]										0.26		0.28	*100.0*	*0.3*
		MS [2/]	0.26													
		CR [3/]	0.02													
	Herbaceous Wetlands															
Subtotal Wetland / Riparian			**0.28**									**0.26**		**0.28**	***100.0***	***0.3***
Agriculture	Agriculture, Pastures, and Mixed Environs															
Subtotal Agriculture																
Developed /	Urban and Mixed Environs															

Table B-5. Summary of Construction-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Winema National Forest

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities							Aboveground Facilities – Klamath Compressor Station	Subtotals					Percent of Total
			Construction ROW	Hydrostatic Discharge Sites [4]	Temporary Extra Work Areas	Uncleared Storage Areas	Rock Source/ Disposal	Access Roads (TARs/PARs/ Improvements) [5]	Pipe Yards		Subtotal Late Successional – Old Growth	Subtotal Mid-Seral	Subtotal Clearcut or Regenerating	Subtotal by Habitat Type	*Percent of Habitat Type*	
Barren	Beaches															
	Roads		1.57		1.61	0.06								3.24	*100*	*3.5*
Subtotal Developed / Barren			**1.57**		**1.61**	**0.06**								**3.24**	***100***	***3.5***
Open Water	Open Water – Lakes, Rivers, and Streams		0.03											0.03	*100*	*0.0*
	Bays and Estuaries															
Subtotal Open Water			**0.03**											**0.03**	***100***	***0.0***
Subtotal Non-Forest			**2.56**		**1.83**	**0.07**						**0.26**	**0.02**	**4.46**		***4.8***
Percent of All Non-Forest			**57.4**		**41.1**	**1.5**						**5.8**	**0.4**	***100***		
Project Total			***68.61***		***12.04***	***11.55***					***44.84***	***11.38***	***31.81***	**92.21**		
Percent of Pipeline Facilities			***74.4***		***13.1***	***12.5***					***48.6***	***12.3***	***34.5***	***100***		

1/ The "Late Successional and Old-Growth" category (LO) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
2/ The "Mid-Seral" category (MS) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
3/ The "Clearcut or Regenerating Forest" category (CR) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years). Forest areas in this category are divided into forest vegetation types based on their potential to become those types of forests.
4/ Small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes/chainsaws. Minimal soil disturbance would occur. A rubber-tired hoe would be utilized to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge.
5/ Portions of some of the Permanent Access Roads (PARs) are located within the construction ROW and there is some duplication in the acreage calculations.

Table B-6. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Winema National Forest

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities						Permanent Easement (50-foot)	Aboveground Facilities																		Total Operation Impacts by Habitat Type[4/]
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type		Jordan Cove MS & BVA #1	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
Forest-Woodland	Westside Lowland Conifer-Hardwood Forest	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
	Montane Mixed Conifer Forest	LO [2/]	1.83		1.83	0.84	4.73	7.40	3.06																			**7.40**
		MS [3/]	0.84						1.40																			
		CR [4/]	4.73						7.87																			
	Southwest Oregon Mixed Conifer-Hardwood Forest	LO [2/]	9.35		9.35	1.78	2.79	13.93	15.60																			**13.93**
		MS [3/]	1.78						2.97																			
		CR [4/]	2.79						4.66																			
	Ponderosa Pine Forest and Woodland	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
	Westside Oak and Dry Douglas-fir Forest and Woodlands	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
	Western Juniper and Mountain Mahogany Woodlands	LO [2/]																										
		MS [3/]																										
		CR [4/]																										
Subtotal Forest-Woodland by Age Class		***LO [2/]***	***11.18***		***11.18***	***2.62***	***7.52***	***21.32***	***18.66***																			***11.18***
		MS [3/]	***2.62***						***4.37***																			***2.62***
		CR [4/]	***7.52***						***12.53***																			***7.52***
Subtotal Forest-Woodland			**21.32**		***11.18***	***2.62***	***7.52***	***21.32***	***35.56***																			**21.32**
Grasslands-Shrubland	Shrub-steppe																											
	Westside Grasslands																											
	Eastside Grasslands		0.26					0.26	*0.42*																			**0.26**
Subtotal Grasslands-Shrubland			**0.26**					**0.26**	***0.42***																			**0.26**
Wetland/Riparian	Westside Riparian-Wetlands/Eastside Riparian-Wetlands	LO [2/]																										
		MS [3/]	0.10			0.1		0.1	*0.17*																			**0.01**
		CR [4/]																										
	Herbaceous Wetlands																											**0.05**
Subtotal Wetland/Riparian			**0.1**					**0.1**	***0.17***																			**0.06**
Agriculture	Agriculture, Pastures, and Mixed																											

Table B-6. Summary of Operation-Related Disturbance (acres) to Corresponding Habitat Category (Johnson and O'Neil, 2001) in Winema National Forest

General Habitat Type	Mapped Habitat Category Type	Forest Stand by Age	Pipeline Facilities						Permanent Easement (50-foot)	Aboveground Facilities																			Total Operation Impacts by Habitat Type[4]
			30-foot Maintenance Corridor	Permanent Access Roads	Subtotal Late Successional Old-Growth Forest	Subtotal Mid-Seral Forest	Subtotal Clearcut / Regenerating Forest	Subtotal Pipeline Facilities By Vegetation Type		Jordan Cove MS & BVA #1	BVA #2	BVA #3	BVA #4	BVA #5	BVA #6, Clarks Branch Meter Station	BVA #7	BVA #8	BVA #9	BVA #10	BVA #11	BVA #12	BVA #13	BVA #14	BVA #15	BVA #16	Klamath CS, BVA #17, MS	Subtotal Aboveground Facilities	
	Environs																												
Subtotal Agriculture																													
Developed / Barren	Urban and Mixed Environs																												
	Beaches																												
	Roads		0.32					0.32	*0.53*																				**0.32**
Subtotal Developed / Barren			**0.32**					**0.32**	***0.53***																				**0.32**
Open Water	Open Water – Lakes, Rivers, and Streams		0.01					0.01	*0.02*																				**0.01**
	Bays and Estuaries																												
Subtotal Open Water			**0.01**					**0.01**	***0.02***																				**0.01**
Subtotal Non-Forest			**0.69**			**0.01**		**0.69**	***1.13***																				**0.69**
Project Total			**22.01**		**11.18**	**2.72**	**7.52**	**22.01**	**36.69**																				**22.01**

1/ The "Late Successional and Old-Growth" category (LO) describes those forest areas with a majority of trees over 80 years of age. Forests with stands greater than 175 years are considered to have old-growth characteristics.
2/ The "Mid-Seral" category (MS) describes those forest areas with a majority of trees over 40 years of age but less than 80 years of age.
3/ The "Clearcut or Regenerating Forest" category (CR) describes those forest areas that are either clear-cut (tree age 0-5 years) or regenerating (tree age 5 to 40 years).
4/ Total by Habitat Type includes the 30-foot maintenance corridor, permanent access roads, and only aboveground facilities with a meter station or compressor station (mainline block valves located within the 30-foot maintenance corridor).
General: If percentages were less than 1/100ths, they were not included in the table.
-Columns and rows do not necessarily sum correctly due to rounding.

Appendix C: Waterbodies Crossed by the Project on National Forest Lands

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Table C- 1: Waterbodies Crossed by the Project on National Forest Lands

Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size [1/]	Proposed Crossing Method Scour Level [2/]	Waterbody Crossing Rationale[3/]	ESA Species Present/Habitat[4/]	Anadromous Species Present [5/]	Resident Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges Y=Yes, Y* = Yes if flowing at time of construction, 1o = 1 pass required outside fish window 1i = 1 pass required inside fish window, if = set inside fish window, N=None
Cascades Ecoregion, South Umpqua (HUC 17100302) Sub-basin, Upper Cow Creek (HUC 1710030206) Fifth field Watershed, Douglas County, Oregon													
Trib. to East Fork Cow Creek (GW014/FS-HF-C)	1229383427835 Forest Service – Umpqua NF	109.17	Perennial (FS – Interpretation) Intermediate	Dry Open-Cut	Dry open-cut methods feasible/practical on small headwater wetland/tributary-if flowing at the time of construction.	None	None	None	None	None	Jul 1 to Sep 15	Unknown	Y*
Trib. to East Fork Cow Creek (GSI016/FS-HF-F)	1229369427819 Forest Service – Umpqua NF	109.33	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 3' wide headwater intermittent tributary if flowing at the time of construction.	None	None	None	None	None	Jul 1 to Sep 15	Unknown	Y*
East Fork Cow Creek (GSP019/FS-HF-G)	1229918428021 Forest Service – Umpqua NF	109.47	Perennial Intermediate	Dry Open-Cut (Streambed-bedrock) [10/]	Dry open-cut methods feasible/practical on small headwater stream during low flow periods within ODFW in-water work period. No additional work areas proposed.	None	Unknown	Assumed	None	None	Jul 1 to Sep 15	3	Y
East Fork Cow Creek (GSP022/FS-HF-G ASP297)	1229918428021 Forest Service – Umpqua NF	109.69	Perennial Intermediate	Adjacent to centerline within TEWA	Not crossed by centerline. Waterbody flows through culvert on road which is encompassed by TEWA 109.68-N. This TEWA was selected for parking/staging as well as for potential mitigation to remove the culvert if the road is not required.	None	Unknown	Assumed	None	None	Jul 1 to Sep 15	3	N

Table C- 1: Waterbodies Crossed by the Project on National Forest Lands

Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size [1/]	Proposed Crossing Method Scour Level [2/]	Waterbody Crossing Rationale[3/]	ESA Species Present/Habitat[4/]	Anadromous Species Present [5/]	Resident Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges Y=Yes, Y* = Yes if flowing at time of construction, 1o = 1 pass required outside fish window 1i = 1 pass required inside fish window, if = set inside fish window, N=None
Trib. to East Fork Cow Creek (FS-HF-J/AW298)	1229332427779 Forest Service – Umpqua NF	109.69	Perennial Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 4' headwater tributary. ROW necked down to 75' and TEWAs only utilized on north side of creek to minimize riparian impacts. Steep topographic conditions prevent a conventional bore because of extensive grading/excavation requirements.	None	Unknown	Assumed	None	None	Jul 1 to Sep 15	Unknown	Y
Trib. to East Fork Cow Creek (FS-HF-K/AW299)	1229332427781 Forest Service – Umpqua NF	109.78	Perennial Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small 2-4' headwater tributary. ROW necked down to 75' and no TEWAs utilized to minimize riparian impacts.	None	Unknown	Assumed	None	None	Jul 1 to Sep 15	Unknown	Y
Cascades Ecoregion, South Umpqua Sub-basin (HUC 17100302), Upper Cow Creek (HUC 1710030206) Fifth field Watershed, Jackson County, Oregon													
Trib. to East Fork Cow Creek (ESI068/FS-HF-N)	Forest Service – Umpqua NF	110.98	Intermittent Intermediate	Dry Open-Cut	Dry open-cut methods feasible/practical on small 2-4' headwater tributary which is expected to be dry at the time of construction.	None	None	None	None	None	Jul 1 to Sep 15	Unknown	Y*
Cascades Ecoregion, Upper Rogue (HUC 17100307) Sub-basin, Trail Creek (HUC 1710030706) Fifth field Watershed, Jackson County, Oregon													
Trib. to W. Fork Trail Creek (ESI068)	Forest Service – Umpqua NF	110.76	Intermittent Minor	Adjacent to centerline within TEWA 110.73	Small 1-2' wide ephemeral drainage located Peavine Quarry within TEWA; drainage to be avoided by construction; drainage expected to be dry during construction.	None	Unknown	Unknown	None	None	Jun 15 to Sep 15	Unknown	N –to be avoided
Eastern Slopes Ecoregion, Upper Rogue (HUC 17100307) Sub-basin, Little Butte Creek (HUC 1710030708) Fifth field Watershed[9/], Jackson County, Oregon													

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Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size [1/]	Proposed Crossing Method Scour Level [2/]	Waterbody Crossing Rationale[3/]	ESA Species Present/Habitat[4/]	Anadromous Species Present [5/]	Resident Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges Y=Yes, Y* = Yes if flowing at time of construction, 1o = 1 pass required outside fish window 1i = 1 pass required inside fish window, if = set inside fish window, N=None
South Fork Little Butte Creek (ASP165)	1226154424195 Forest Service-Rogue River NF	162.45	Perennial Intermediate	Dry Open-Cut Level 1	Dry-open cut feasible and practical on creek. ODFW fish passage barrier data (RecordID 51163) indicates that downstream irrigation diversion dam/barrier (~ 0.5 miles): is unladdered and impassible. USGS Gage Station 14339500 – located below diversion reports monthly mean flow of 14, 12 and 11 cfs, respectively for Jul, Aug & Sep. ROW necked down to 75 feet and TEWAs set back to minimize riparian impacts.	None	None	Trout, unspecified	None	None	Jun 15 to Sep 15	2 and 4A	Y-1i with mid-stream support
Daley Creek (ESI076)	1223666423096 Forest Service-Rogue River NF	166.21	Intermittent Intermediate	Dry Open-Cut	Dry open-cut methods feasible/practical on small headwater intermittent trib. if flowing at the time of construction.	None	None	Trout, Unspecified	None	None	Jun 15 to Sep 15	Unknown	Y*
Eastern Slopes Ecoregion, Upper Klamath River (HUC 18010206) Sub-basin, Spencer Creek (HUC 1801020601) Fifth field Watershed [9/], Klamath County, Oregon													
Spencer Creek (EW085)	1220277421487 Forest Service-Winema NF	171.07	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small < 10’ wide stream with associated wetland. ROW necked down 75 feet and TEWAs set back or located to the edge of existing road disturbance to minimize riparian and wetland impacts. Conventional bore not practical because of topographic conditions and grading/excavation requirements on the south side of creek.	None	None	Redband Trout Possible Brook Trout	None	None	Jul 1 to Sep 30	5: 303(d)	Y

Table C- 1: Waterbodies Crossed by the Project on National Forest Lands

Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size [1/]	Proposed Crossing Method Scour Level [2/]	Waterbody Crossing Rationale[3/]	ESA Species Present/Habitat[4/]	Anadromous Species Present [5/]	Resident Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges Y=Yes, Y* = Yes if flowing at time of construction, 1o = 1 pass required outside fish window 1i = 1 pass required inside fish window, if = set inside fish window, N=None
Trib. to Spencer Creek (GSP007)	1221988422850 Forest Service-Winema NF	171.57	Perennial Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small < 2' wide intermittent trib/wetland. if flowing at the time of construction.	None	None	Unknown	None	None	Jul 1 to Sep 30	Unknown	Y*
Trib. to Spencer Creek (EW107)	1221837422760 Forest Service-Winema NF	172.48	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small < 10' wide intermittent trib. if flowing at the time of construction. ROW necked down 75 feet and TEWAs set back to minimize riparian and wetland impacts.	None	None	Unknown	None	None	Jul 1 to Sep 30	Unknown	Y*
Trib. to Spencer Creek (ESI106)	Forest Service-Winema NF	173.74	Intermittent Minor	Dry Open-Cut	Dry open-cut methods feasible/practical on small < 5' wide ephemeral trib. if flowing at the time of construction.	None	None	Assumed	None	None	Jul 1 to Sep 30	Unknown	Y

Table C- 1: Waterbodies Crossed by the Project on National Forest Lands

Waterbodies Crossed and Waterbody ID	Identification Number (LLID) and Jurisdiction	Approximate Pipeline MP	Waterbody Type Size [1/]	Proposed Crossing Method Scour Level [2/]	Waterbody Crossing Rationale[3/]	ESA Species Present/Habitat[4/]	Anadromous Species Present [5/]	Resident Species Present	EFH Species Present [6/]	EFH Component Present [6/]	Fishery Construction Window [5/, 7/]	Water Quality Status [8/]	Equipment Bridges Y=Yes, Y* = Yes if flowing at time of construction, 1o = 1 pass required outside fish window 1i = 1 pass required inside fish window, if = set inside fish window, N=None

1/ FERC waterbody definitions:
Minor = less than or equal to 10 feet wide
Intermediate = greater than 10 feet wide but less than or equal to 100 feet wide
Major = greater than 100 feet wide

2/ Level 1 and 2 waterbodies have been identified; all others are Level 0. According to GeoEngineers 2013 Channel Migration and Scour Analysis for the Project, channel migration is defined as the lateral movement, over time, of an entire channel segment perpendicular to the direction of stream flow; channel avulsion is the sudden abandonment of an active channel for a newly created or previously abandoned channel located on the floodplain; channel widening is defined as erosion and subsequent recession of one or both stream banks that widens the channel without changing the channel location; streambed scour is erosion of the streambed resulting in the development of deep pools and/or the systematic lowering of the channel floor elevation.
Level 0 = streams not likely subject to migration, avulsion and/or scour
Level 1 = streams with a moderate potential for migration, avulsion and/or scour
Level 2 = streams with a high potential for migration, avulsion and/or scour

3/ Dry open-cut crossing methods include Flume or Dam and Pump procedures. Dam and Pump methods would be utilized where streambed blasting is anticipated to eliminate blasting around the flume. The Dam and Pump crossing method is the preferred crossing procedure in steep incised drainage valleys where worker safety may be compromised when placing ("threading") the pipe string under the flume pipe and where there is a risk of upsetting the flume during this operation. The Dam and Pump crossing method is also the preferred crossing method on small streams under low flow conditions during the recommended ODFW-recommended in-water work period. Pacific Connector requests permission for temporary/short-term fish passage restriction when completing Dam and Pump crossings within the ODFW-recommended in-water work period.

4/ FWS, NMFS, and StreamNet. T = Threatened, E = Endangered, CH = Critical Habitat

5/ ODFW 2012.

6/ PFMC 1999; ODFW 2012.

7/ Pacific Connector understands that fisheries' construction windows only apply to those waterbodies flowing at the time of construction.

8/ Oregon Department of Environmental Quality Water Quality Status:
Unknown = waterbody is not registered with Oregon Department of Environmental Quality (ODEQ 2012)
2 = Available data and information indicate that somedesignated uses are supported and the water quality standard is attained.
3 = Insufficient data to determine whether a designated use is supported.
4A = Total maximum daily loads that will result in attainment of water quality standards have been approved
5: 303(d) = Data indicate a designated use is not supported or a water quality standard is not attained and a Total Maximum Daily Load is needed. This category constitutes the Section 303(d) list that EPA will approve or disapprove under the Clean Water Act.

9/ Key Watershed.

10/ Streambed bedrock based on Pacific Connector's Wetland and Waterbody delineation surveys (see the Wetland Delineation Report, submitted as a stand-alone document). Streambed bedrock may require special construction techniques to ensure pipeline design depth. Special construction techniques may include rock hammering, drilling and hammering, or blasting. The need for blasting would be determined by the contractor and would only be initiated after ODFW blasting permits are obtained.

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Appendix D: Estimates of Snags on National Forest Lands

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Table D-1 Estimate of Snags on National Forest Lands within Areas Impacted by the Proposed Action													
Umpqua							**Rogue River**						
Age class	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**	**Age class**	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**
LO	Hard	89	444	53	71	0	LO	Hard	78	194	16	8	1
	Soft		9	36	18	36		Soft		0	47	16	0
MS	Hard	33	167	20	27	0	MS	Hard	13	32	3	1	0
	Soft		3	13	7	13		Soft		0	8	3	0
CR	Hard	21	106	13	17	0	CR	Hard	83	207	17	8	1
	Soft		2	8	4	8		Soft		0	50	17	0
Total	Hard	143	717	86	115	0	Total	Hard	173	433	35	17	2
	Soft		14	57	29	57		Soft		0	104	35	0
Winema							**National Forest Total**						
Age class	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**	**Age class**	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**
LO	Hard	39	118	4	4	0	LO	Hard	206	756	73	83	1
	Soft		0	16	4	0		Soft		9	98	37	36
MS	Hard	9	28	1	1	0	MS	Hard	56	227	24	29	0
	Soft		0	4	1	0		Soft		3	25	10	13
CR	Hard	27	82	3	3	0	CR	Hard	132	396	32	28	1
	Soft		0	11	3	0		Soft		2	69	24	8
Total	Hard	76	229	8	8	0	Total	Hard	393	1379	128	140	2
	Soft		0	31	8	0		Soft		14	192	71	57

Table D-2 Estimate of Snags on National Forest Lands within 700 feet of the Proposed Action													
Umpqua							**Rogue River**						
Age class	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**	**Age class**	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**
LO	Hard	921	4,604	552	737	0	LO	Hard	964	1,447	193	96	10
	Soft		92	368	184	368		Soft		0	482	193	0
MS	Hard	790	3,948	474	632	0	MS	Hard	289	433	58	29	3
	Soft		79	316	158	316		Soft		0	144	58	0
CR	Hard	396	1,982	238	317	0	CR	Hard	1,097	1,645	219	110	11
	Soft		40	159	79	159		Soft		0	548	219	0
Total	Hard	2,107	10,533	1,264	1,685	0	Total	Hard	2,350	3,525	470	235	23
	Soft		211	843	421	843		Soft		0	1,175	470	0
Winema							**National Forest Total**						
Age class	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**	**Age class**	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**
LO	Hard	287	861	29	29	0	LO	Hard	0	6,912	774	862	10
	Soft		0	115	29	0		Soft		92	965	406	368
MS	Hard	161	483	16	16	0	MS	Hard	0	4,864	548	677	3
	Soft		0	64	16	0		Soft		79	525	232	316
CR	Hard	866	2,597	87	87	0	CR	Hard	0	6,223	544	513	11
	Soft		0	346	87	0		Soft		40	1,053	385	159
Total	Hard	1,314	3,941	131	131	0	Total	Hard	5,770	17,999	1,865	2,052	23
	Soft		0	525	131	0		Soft		211	2,543	1,023	843

Table D-3 Estimate of Snags on National Forest Lands within 3,200 feet of the Proposed Action													
Umpqua							**Rogue River**						
Age class	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**	**Age class**	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**
LO	Hard	4,861	24,306	2,917	3,889	0	LO	Hard	4,400	6,600	880	440	44
	Soft		486	1,944	972	1,944		Soft		0	2,200	880	0
MS	Hard	1,970	9,848	1,182	1,576	0	MS	Hard	584	876	117	58	6
	Soft		197	788	394	788		Soft		0	292	117	0
CR	Hard	2,262	11,308	1,357	1,809	0	CR	Hard	5,787	8,681	1,157	579	58
	Soft		226	905	452	905		Soft		0	2,894	1,157	0
Total	Hard	9,092	45,462	5,455	7,274	0	Total	Hard	10,771	16,157	2,154	1,077	108
	Soft		909	3,637	1,818	3,637		Soft		0	5,386	2,154	0
Winema							**National Forest Total**						
Age class	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**	**Age class**	**Decay class**	**Forested acres**	**<13**	**13-24**	**25-36**	**>36**
LO	Hard	1,092	3,276	109	109	0	LO	Hard	10,353	34,182	3,906	4,438	44
	Soft		0	437	109	0		Soft		486	4,581	1,961	1,944
MS	Hard	242	725	24	24	0	MS	Hard	2,795	11,448	1,323	1,658	6
	Soft		0	97	24	0		Soft		197	1,176	535	788
CR	Hard	3,716	11,147	372	372	0	CR	Hard	11,765	31,136	2,886	2,760	58
	Soft		0	1,486	372	0		Soft		226	5,285	1,981	905
Total	Hard	5,049	15,148	505	505	0	Total	Hard	24,913	76,767	8,115	8,856	108
	Soft		0	2,020	505	0		Soft		909	11,042	4,478	3,637

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